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EDITOR OF THE MONTH

RICHARD KOVACS, M.D.
New York, N. Y.

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DR. SIMON BARUCH AND HIS FIGHT FOR FREE PUBLIC BATHS

MAJOR THOMAS E. KEYS

Medical Administrative Corps, Army of the United States

and

FRANK H. KRUSEN, M.D.

Section on Physical Medicine, Mayo Clinic

ROCHESTER, MINN.

> "When Minerva, as the Poets fancy, made a Bath for Hercules, and both became the Deitys of all the Baths in the World, we were then taught, Kind Reader, what we still find true, that Bathing is of great use after hard Labour, and mightly refresheth all weary Persons." — Thomas Guidott, in his "An Apology for the Bath," 1705.

In looking through the rare book file in the Army Medical Library, one of us (T. E. K.) ran across a modestly bound scrapbook which had the title "Public Baths." This book had been housed in the glass case section of the library, the section containing some of the library's important rarities. On first glance, it did not seem to be important enough to be shelved next to the first edition of Darwin's "Origin of Species" and in close proximity to Oliver Wendell Holmes' "Contagiousness of Puerperal Fever." But on closer examination it definitely belonged with these rarities, for it was documentary evidence of one man's ten year fight, and a successful one, for free public baths in America.

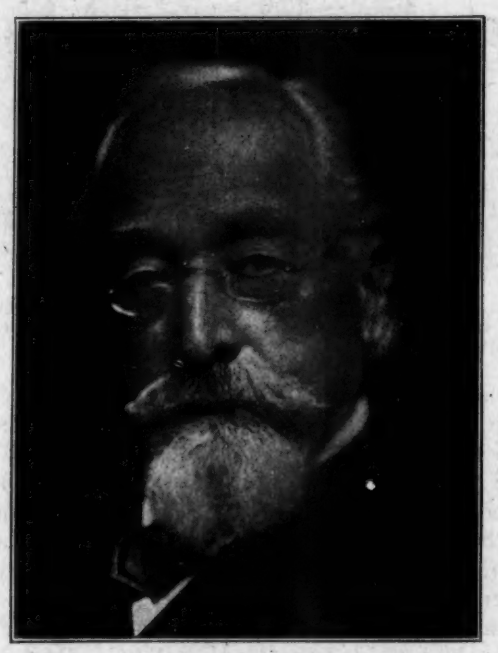

Fig. 1. — Dr. Simon Baruch (1840-1921).

To those of us who enjoy a good shower bath at frequent intervals, it would seem strange not to have this accommodation. However, it is only a matter of years since Dr. Simon Baruch (fig. 1) introduced the shower

bath, or, as it used to be called, "the rain water bath," to our country. But much more important for our country's health than his introduction of the shower bath is his making available to the masses of our people free public baths, a most important but much overlooked hygienic measure for the prevention of disease. This then is the story.

The practice of bathing is probably as old as man himself. Man has always enjoyed water, and it does not take much conjecture to believe he often has derived therapeutic benefits from its use. Certainly when he was tired or dirty, water refreshed him. As Klebs[1] has shown, archaeologic research has revealed provisions for bathing in water and stream. Primitive peoples also believed fervently in the healing powers of springs.

During the sixteenth and seventeenth centuries, there seems to have been a revival of the use of baths. Figure 2 shows the shower baths at Aachen.

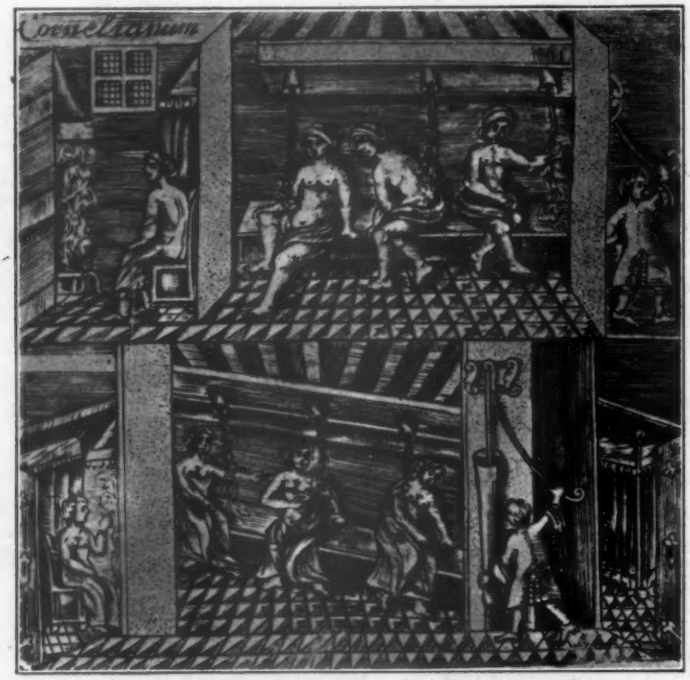

Fig. 2. — The shower baths at Aachen in the sixteenth or seventeenth century. From Franciscus Blondel's "Thermarum Aquisgranesium et Porcetanatum elucidatio et thaumaturgia," Aquisgrani, J. C. Clemens, 1688 (courtesy of the Army Medical Library).

For many years public baths have been in existence in Europe. According to Baruch,[2] the first modern public bath and washhouse was established in Liverpool about 1842. London and Glasgow soon followed by building baths for which 1 penny was charged. Parliament took an active interest and passed laws for the maintenance of public baths.

In America about 1860, it was difficult to obtain enough water in hotel rooms for bathing. A supply for washing hands and face once a day was considered sufficient.

Dr. Baruch[3] came to New York City to practice medicine in 1881. Previous to this time he had resided in Camden, S. C. Because of its size, New York City afforded a great contrast to Camden, and soon there was a transi-

1. Klebs, A. C.: Balneology in the Middle Ages, Tr. Am. Climat. & Clin. A. 32:15, 1916.
2. Baruch, Simon: A Plea for Public Baths, Together with an Inexpensive Method for Their Hygienic Utilization, Dietetic Gaz. 7:89 (May) 1891.
3. Simon Baruch: J. Am. A. Prom. Hyg. & Pub. Baths 4:7, 1922.

tion from a successful practitioner to a high-spirited public citizen and philanthropist.

Baruch was quick to observe the filthy condition of the poor in New York. One only had to ride on a crowded street car to whiff the "tenement odor," which he vividly described as follows:[3]

> The so-called tenement odor which so often offends the sensitive olfactories in crowded street cars and other assemblies of the poor, emanates from the decomposed secretions of the skin, which have accumulated upon their persons and found lodgment in their unventilated clothing.

While, in 1891, the New Yorkers of means had one or more bath tubs in their homes, the poor classes had no bathing facilities whatever. Dr. Baruch explored the tenements and found appalling conditions. An average tenement was found to consist of one front or rear room with windows and two or three dark bedrooms in which people were all huddled together. He found the water supply for an entire floor, usually occupied by four families, to be obtained from a faucet in a dark hallway, where all must wash or obtain water. He also found that accommodations for servants in homes of wealthy people rarely had good bathing facilities.

To Dr. Baruch it was not only a moral obligation that the better-off New Yorkers contribute money so that uncleanliness be removed from the city but also a safety measure for all households. Above all, Baruch thought that, since it was the function of the city authorities to protect the population against the causes of disease and death, they should abolish uncleanliness—the ever present disease-producing factor—and the remedy was to install public baths which must, like public parks, be free.

Besides his philanthropic interest in public baths for the workers, Dr. Baruch was keenly interested from the large medical viewpoint. From 1862, when he was graduated from the Medical College of Virginia (he spent the war years as an assistant surgeon with the Confederate Army), until 1886 or thereabouts, he was interested in the study and practice of medicine generally. After 1886 he continued his private practice but placed special emphasis on water as a remedial agent. In America he became known as the leading exponent of hydrotherapy and, indeed, was often called "the apostle of bathing."

In his early fight for public baths of the indoor shower type, Dr. Baruch held that the river baths were not fit for cleansing, because bathing suits were necessary, and that furthermore there was danger of infection from polluted water. (He defined Manhattan Island as "a body of land surrounded by sewage.")[4] He also made a point that the river baths were open only in summer and were used only by the younger and more vigorous members of the community. In this connection it is interesting to recall that Boston[5] was probably the first city to establish and maintain the river bath (floating bath) at city expense. In 1866, five floating baths and one beach bath were established in Boston.

The first plea for rain water (shower) baths in this country was made by Dr. Baruch. It appeared as an editorial in the *Medical Times and Register of Philadelphia* for Aug. 24, 1889. While the principle of the shower bath was known to the ancients and was developed somewhat in the sixteenth and seventeenth centuries, the modern idea of the public shower is a product of Germany and was developed by Dr. Oscar Lassar, president of the Berlin Society for People's Baths. The first public bath was constructed on this principle in 1887 in Vienna. The first shower baths of im-

4. Baruch, Simon: Public Baths, Proc. Am. A. Prom. Hyg. & Pub. Baths 5:8, 1916.
5. Cole, W. I.: Free Municipal Baths in Boston, Municipal Printing Office, 1899, 53 pp.

portance were established in the barracks of the Kaiser Franz Grenadier Regiment of the Guard in Berlin in 1878. These were for the use of officers and enlisted men. Their facilities provided for the bathing of 300 men an hour.[6]

With the proposal for the shower type bath came Baruch's denunciation even in his time, of the "old-fashioned tub." He felt that the difficulty of keeping tubs clean and the large quantity of water they used were obstacles for the public use of baths of this type.

Although it took a ten year knock-down and drag-out fight to put over his ideas to city officials, Dr. Baruch was able, after one conference, to convince authorities of the New York Juvenile Asylum concerning his ideas of bathing. According to Dr. Baruch's[4] suggestions, a shower type of bath was installed in 1890 (fig. 3). It consisted of sixty-eight sprinklers, 20 inches

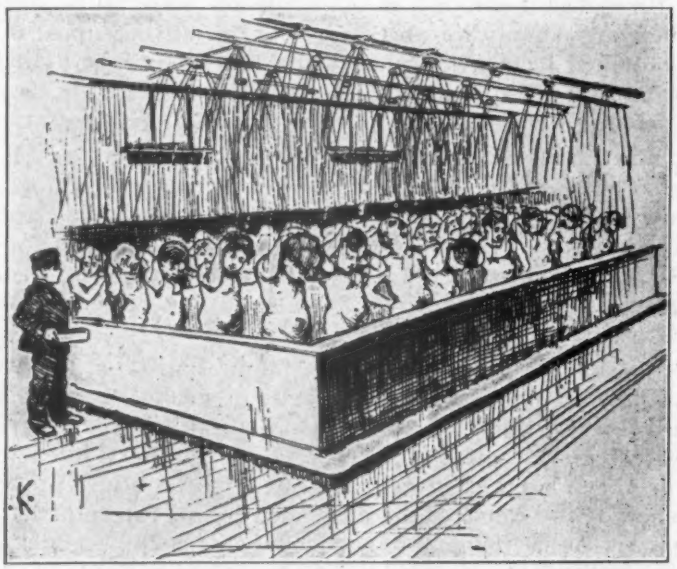

Fig. 3. — Shower bath installed at the New York Juvenile Asylum in 1890 under Dr. Baruch's guidance. From Simon Baruch's "A Plea for Public Baths." [2]

(51 cm.) apart, connected by pipes near the ceiling. The water was heated by admixture with steam. It bathed 280 children in an hour, whereas formerly only 80 could be cleansed in their plunge bath.

Prior to this, Dr. Baruch had spent several months in Germany studying, at his own expense, the system of public rain baths that were there so successful. Immediately on his return from the continent in September, 1890, he read a paper before the Social Science Convention in Saratoga, N. Y. This was entitled "The Status of Water in Modern Medicine." Here he expounded his ideas for free municipal bathing. As chairman of the Committee on Hygiene of the County of New York, Dr. Baruch gave also a report on public shower baths.[7] Both of these reports were favorably received by their audiences. One beneficial result was the erection of The Peoples Baths, financed by the Association for Improving the Condition of the Poor. By the request of the altruistic Dr. H. E. Crampton, Dr. Baruch[2] appeared before its executive committee on Nov. 25, 1890. Here he had an intelligent appreciation and a sympathetic audience. A committee was ap-

6. Wentworth, Jeanie W.: The Inception and Development of the Idea of Free Public Baths, J. Am. A. Prom. Hyg. & Pub. Baths 5:14, 1923.

7. Watson, I. A.: Physicians and Surgeons of America, Concord, N. H., Republican Press Association, 1896, pp. 534-535.

pointed, consisting of Col. G. W. Hamilton and Dr. Gouverneur Smith. They appeared the following morning before the mayor with a petition asking for the free use of public water for a bath to be immediately constructed. Meanwhile Dr. Baruch had plans made for the proposed bath. These were approved on Dec. 1, 1890; a lot was secured, money was appropriated and The Peoples Baths (also called the Centre Market Baths) were erected in 1891. They had accommodations for 500 bathers daily. Between 70,000 and 80,000 baths were given here each year.

Shortly after the construction of The Peoples Baths, the *New York Herald* of Oct. 25, 1891, carried an account of the inauguration of another privately financed public bath. This bath was named after Baron de Hirsch.[8] It was located at the corner of Henry and Market streets and was used chiefly, by German, Polish and Russian Jews. About 70,000 baths were given there annually.

Mention should also be made of the erection about this time of the Demilt Dispensary Baths.[8] These consisted of six shower baths and one tub bath and accommodated about 15,000 bathers annually.

Meanwhile other cities became interested in Dr. Baruch's proposals. Dr. Gertrude Gail Wellington, of Chicago, corresponded with him about free public baths, being especially interested in the rain water type of bath that Dr. Baruch had introduced to the United States. Largely through their joint efforts and the cooperation of Mayor Carter B. Harrison, the first free

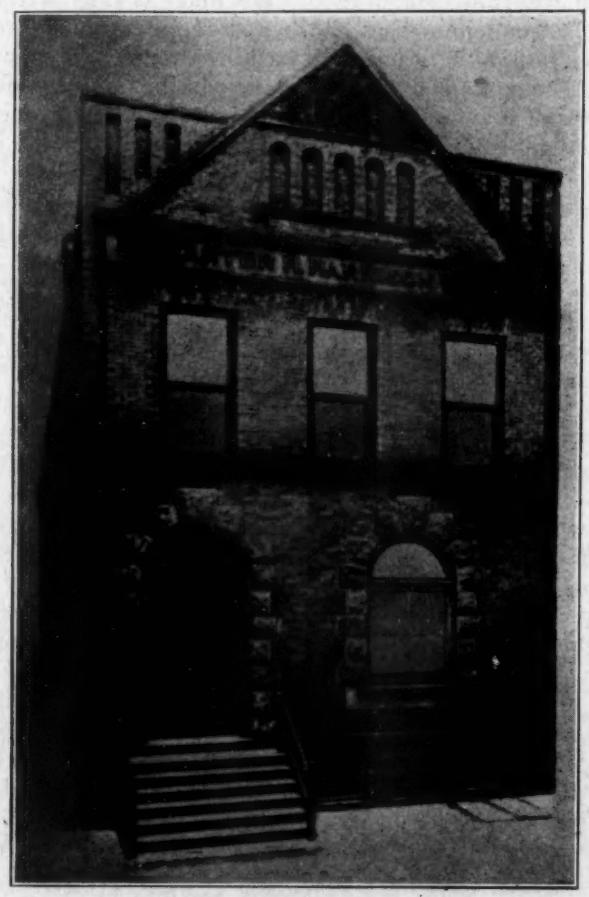

Fig. 4. — The Carter H. Harrison Bath, Chicago. Opened in 1894, it was the first free public bath in the world.

8. Fisk, H. E.: The Introduction of Public Rain Baths in America, Sanitarian 36:481, 1896.

public bath in the world was constructed in Chicago. It was opened in January, 1894 (fig. 4). Several years were to elapse before New York City had its first free public bath (1901). It had been the desire of Mayor Harrison to name the first free public bath in the world after Dr. Baruch.[9] But his untimely death intervened and the bath was named after the mayor, whose public career had been marked by his effort and interest in free public baths and other hygienic measures. Dr. Baruch's efforts were not forgotten, however, and Chicago honored him by naming its eleventh ward bath after him on April 22, 1910.[10] Soon other cities followed Chicago's example, Philadelphia and Buffalo being among the first.

While Dr. Baruch's efforts for Chicago were quick to bear fruit and he had succeeded in initiating a few public baths, privately financed, he had not as yet achieved his goal—free public baths for all the needy of New York City. He approached the city officials, feeling that it was their function to make provision for these baths. In December, 1890, Dr. Baruch appeared before the city board of health. All present were sympathetic but said they had no authority to act. Baruch next approached the mayor and his board of aldermen. Alderman Henry Flegenheimer offered to head a subscription for building a free bath for the workmen with $200. Dr. Baruch appreciated his support but wanted the expenses of the baths to come from city funds. After some delay, he was granted an audience with Mayor Grant (April 20, 1891). The mayor was not interested.

Dr. Baruch was not discouraged. He made a third attempt. He suggested to Mr. Flegenheimer that the board of aldermen appropriate $25,000 for the construction of a municipal bathing house. This advice was followed and Mr. Flegenheimer succeeded in passing his resolution before the aldermen. But the mayor did not approve the resolution, feeling that public sentiment was not behind the issue. Flegenheimer made one more trial. He asked Dr. Baruch to help him "circumvent the mayor" by organizing the largest possible delegation of citizens to call on "his honor" as quickly as possible before the election.[11] No account remains of the outcome of this letter. At any rate the third attempt ended in failure.

Meanwhile two members of the state legislature of New York ardently supported Dr. Baruch. These were Otto Kempner, formerly secretary to Mr. Flegenheimer, and Goodwin Brown, of Albany. Brown prepared a bill (chapter 473, laws of 1892), approved by the governor, as follows:[9] "It shall be lawful for any city, village, or town to establish free public baths. Any city, village or town may loan its credit or make appropriations of its funds for the purpose of establishing free public baths." This bill had no teeth to it, not being mandatory, but phrased in this way it was passed by Governor Flower. Although it was unsatisfactory in form, this bill was the first statute on public baths and served as a basis for better statutes later to be approved.

Mr. Kempner introduced his bill on Feb. 16, 1893. It was entitled "An act to establish a bureau of public baths in the City of New York, and to provide for the construction and maintenance of six new permanent public baths in said city." The act required the approval of the mayor of New York City. Dr. Baruch appeared before Mayor Gilroy on March 13, 1893. Baruch's experience with Mayor Gilroy was no better than his former experiences with Mayor Grant. The mayor was not impressed. He said that he believed there was no public sentiment in favor of such baths! Dr. J. D. Bryant, health commissioner of New York City, had also objected to the

9. Reynolds, Arthur R. (Commissioner, Department of Health, Chicago): Letter to Dr. Baruch, May 31, 1904.
10. Chicago Daily Tribune, April 22, 1910.
11. Flegenheimer, Henry (Office of the Board of Aldermen): Letter to Dr. Baruch, Oct. 22, 1891.

proposed bill, saying,[12] "To my mind this bill is so full of defects that in case it be not possible to correct them, it should be consigned to the waste paper basket of the Assembly Chamber." Because of this strong opposition, the fourth attempt to establish free municipal bath houses ended in failure.

Having failed four times to obtain the consent of the city authorities, Dr. Baruch, in 1894, again conferred with Goodwin Brown. Together they planned a mandatory bill which would make it compulsory for all cities of 50,000 population or more to establish and maintain free public baths. At that time, Goodwin Brown was a member of the New York State Commission in Lunacy. He worked hard on this bill. G. W. Hamilton also was greatly interested.[13] As chairman of the committee of the house, he gave the bill his wholehearted support. He also fought for it in the senate. Dr. Joseph Bryant, health commissioner, aided and encouraged the passage of this bill. He was instrumental with his successor, Dr. Edson, in securing the cooperation of President Wilson of the board of health in obtaining a report from Dr. Roberts, sanitary superintendent, on the proposed locations for free baths.

The long struggle to secure adequate legislation was not in vain. The bill introduced in 1894 by Goodwin Brown[14] was passed by the legislature and signed by the governor on April 18, 1895. Under this act, Yonkers opened the first bath house in October, 1896. Buffalo opened a bath house in January, 1897. Rochester, Albany, Syracuse, Troy and Utica soon followed. But New York City was still without its public baths. Why?

For New Yorkers this act remained without effect. Mayor Strong created the Mayor's Committee on Public Baths and Comfort Stations on June 25, 1895. Although this committee was directed to take immediate action, it was not until March 25, 1897, that it reported and then unfavorably. In spite of the fact that a new bath bill had been enacted, which even made provision for comfort stations, the committee, which had made an investigation of public baths in this country, as well as in Europe, concluded that no further action could be taken without additional legislation. The committee assumed erroneously that this act demanded the use of parks for bath purposes.

Public opinion was aroused and Mayor Strong was vigorously assailed in the newspapers for his neglect in the matter (fig. 5). Only by accident did Dr. Baruch happen to see the report of the mayor's committee. Unfortunately, the city health department agreed with the committee. On May 20, 1897, Dr. Baruch met with Dr. George B. Fowler, health commissioner, as well as with a city attorney. He convinced them that they were in error in their interpretation of the law.

At Dr. Baruch's suggestion the New York Academy of Medicine passed a resolution to appoint a committee to wait on the mayor and urge that he execute the mandatory bath act.[15] The committee selected consisted of Drs. Baruch, R. Van Santvoord and G. B. Fowler. The following day (June 4, 1897) the committee of the academy had a very satisfactory interview with Mayor Strong. He informed them that he had in mind a lot on Rivington Street suitable for immediate construction of a bath house. Steps were immediately taken toward the building of the Rivington Street Bath but, because of contracting difficulties, four years passed before the first free public shower bath was opened to the public. In 1917, by order of the board of aldermen, this bath was officially named the "Dr. Simon Baruch Public

12. Bryant, Joseph D.: Letter to Dr. Baruch, Feb. 23, 1893.
13. Baruch, Simon: The Public Baths (letter to the editor), Sanitarian, July 1892, pp. 83-84.
14. Brown, Goodwin: Letter to Dr. Baruch, April 19, 1895.
15. New York Academy of Medicine: Extract from the Minutes, May 20 and June 3, 1897.

Bath." The Rivington Street Bath met with considerable success, bathing 700,000[16] people the first year. Warm water, soap and towels were furnished gratis. In 1909, there were ten such institutions, bathing more than 5,000,000 people in New York and 3,000,000 in Brooklyn. In 1938, as a result of Dr. Baruch's early stimulus, there were more than 100 bath houses in operation in the United States, free or charging a nominal fee of 5 cents.[16]

In 1938, a WPA project was set up to remodel the baths and comfort stations, since it was found that all the baths were obsolete and in need

EVENING WORLD, June 4, 1897.
THE QUESTION OF THE DAY ANSWERED.
TONGS
Says Mayor Strong: "It is true the free baths have not been built, though $200,000 appropriated. But what are FREE baths to me? I don't need free baths."

Fig. 5. — This issue of the New York *Evening World* (June 4, 1897) was being hawked outside of the city hall while the mayor was granting the Rivington Street Bath within.

of extensive repairs. The buildings were more than thirty-five years old. The roofs needed replacement. All of the marble partitions were cracked—eaten away by the acids of the cleaning materials. Plumbing and heating systems needed replacement.[17] Unfortunately a change in WPA policy caused abandonment of this program after only a portion of the work had been done. Work of renovating the baths continued, however, and by 1943 four of the five public baths of Manhattan had been or were being remodeled along modern lines or being put in usable condition. As part of the post-war program, Manhattan hopes to see to it that all of its public baths are in first class condition.

Meanwhile the old public bath building which had been named after Dr. Baruch had also deteriorated. Furthermore, the structure was hemmed in on both sides by tenements, and it was impossible in the extensive rehabilitation program under way to provide adequate light and air for the structure or to provide any open space adjacent to it. Dr. Baruch's son, Mr.

16. Centennial, Medical College of Virginia, 1838-1938, New York Alumni Association, Medical College of Virginia, June 1, 1937. (Dedicated to the memory of a most distinguished and beloved Alumnus, Dr. Simon Baruch).

17. Lewis, R. F.: Operations of Public Baths and Comfort Stations, Functions and Procedures of the Office of the Borough President of Manhattan, Service Training Course, Session 3A, Dec. 21, 1943.

Bernard Baruch, generously offered $85,000 for acquisition of adjacent property so as to improve the conveniences of the building and place it in a better setting. The reconstructed bath building, opened on May 17, 1940 (fig. 6), had been provided with additional windows, ventilation, light and enlarged

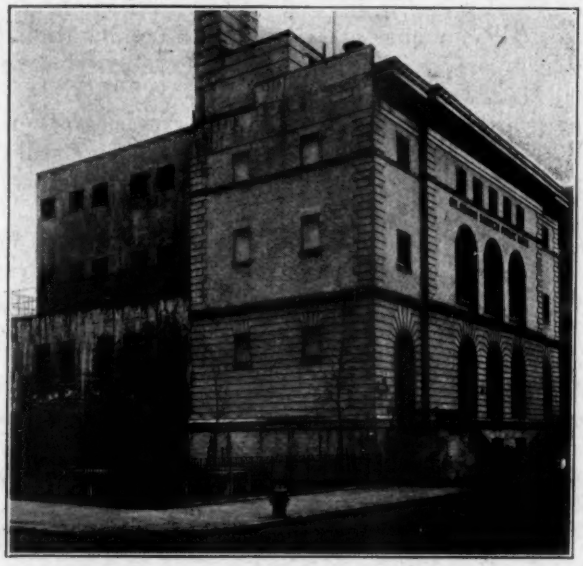

Fig. 6. — The reconstructed Dr. Simon Baruch Public Bath building.

recreation, gymnasium, bathing and swimming facilities. The playground contains, besides a sand pit and shower basin, a brick comfort station and a landscaped sitting area with quiet games for adults, in the center of which is a memorial flagpole bearing a plaque reading:

BARUCH PARK
A GIFT TO THE CITY
BY
BERNARD M. BARUCH
ON THE OCCASION OF THE
RECONSTRUCTION OF THE
BATH ORIGINALLY NAMED IN HONOR OF
HIS FATHER
SIMON BARUCH, M.D.

PHYSIOLOGIC FUNDAMENTALS OF SPA THERAPY

JACQUES GOLDBERGER, M.D.

SARATOGA SPRINGS, N. Y.

Spa therapy is the conventional name for a combination of therapeutic procedures in which hydriatrics are used for a certain period either internally or externally or in both ways.

The term "hydriatics," as introduced in the American literature by E. E. Smith and W. E. Fitch,[1] is a collective name for such natural resources as mineral waters and peloids (muds of mineral or vegetable origin) which are related to water.

Mineral waters are electrolytic solutions produced by nature with or without gaseous content. For a consideration of their physiologic effects one may classify mineral waters as follows:

1. On the basis of the temperature of the water at the source.
2. On the basis of dominant chemical constituents.
3. According to gaseous constituents.
4. According to the osmotic influence on body tissues and fluids.

The classification according to temperature at the source offers the following groupings: (*a*) nonthermal cold (temperature below 70 F.); (*b*) thermal tepid (temperature above 70 F. and below 98 F.); (*c*) thermal (temperature above 98 F. and below 106 F.); (*d*) hyperthermal (temperature above 108 F.).

In the classification of mineral waters according to their chemical constituents it is customary to use conventional terms which are obsolete but generally used. Waters such as boiler (Hot Springs, Va.) or geyser (Saratoga Springs, N. Y.), in which the combination of the alkali (KNa) or alkali-earth (CaMg) ions with the bicarbonate (HCO_3) ion dominates, are called alkaline waters. Salines are such mineral waters as hathorn (Saratoga Springs, N. Y.) or hot springs (Arrowhead Springs, Calif.), in which the combination of the chloride or sulfate with the cations potassium, sodium, calcium and magnesium predominates. We speak of alkaline-muriatic or alkaline-saline waters when the cations of the alkaline or earth-alkaline group are combined with the bicarbonate, chloride or sulfate anions. Such combinations are found in coesa (Saratoga Springs, N. Y.) or sulfur (Arrowhead Springs, Calif.) waters. Ferruginous, or chalybeate, waters are those in which the iron is present in its active ferrous ion form, as in Lincoln (Saratoga Springs, N. Y.) There are mineral waters in which special therapeutic elements are present, such as lithium (eureka, Saratoga Springs, N. Y.), strontium, arsenic or iodine (selzer, Springdale, Colo). These waters are usually named according to their therapeutic constituents.

The most common of the gaseous constituents is carbon dioxide, which is usually present in alkaline and alkaline-saline and is often present in saline waters. Hydrogen sulfide is the essential ingredient of the so-called "sulfuretted" waters (Sharon Springs, N. Y. and many other places in this country). Radium waters contain radium, not as an element but in the form of an emanation which is called radon.

In the classification according to their osmotic influences, mineral waters are considered with respect to their freezing points in comparison with the freezing point of blood plasma, which is —0.69 C. We call a mineral water isotonic when its freezing point is identical with the freezing

1. Fitch, W. E.: Mineral Waters of the United States and American Spas, Philadelphia, Lea & Febiger, 1927, p. 43.

point of plasma, hypotonic when its freezing point is above that of plasma and hypertonic when its freezing point is below that of plasma.

The term "peloid" was introduced by the International Society for Medical Hydrology, London, as a means of grouping under one heading the different mineral peats and vegetable muds. Such materials occur in crude form in nature and must undergo different processes before they are usable for packs and baths. The purpose of the processing is to transform the crude substance into a finely dispersed suspension.

In summarizing, it can be stated that hydriatics used in spa therapy are either aqueous solutions of salt and gases or aqueous colloidal emulsions and mechanical suspensions.

In dealing with the physiologic effects of hydriatics it is necessary, therefore, to survey first the physiologic effects of plain water (sweet or distilled), because water is not a physiologically indifferent substance but produces, as Simon Baruch[2] said, so many physiologic effects that it may be placed in many categories of materia medica.

I. Effects of Ingested Water

The fluid contents of the body are replenished either by the fluid and moist food ingested or by the water formed in metabolism. Ingested water is forwarded, by the process of deglutition, into the stomach. Water passes from the stomach through the pylorus in squirts into the small intestine. The passage of water through the stomach is markedly influenced by the amount and temperature of the ingested water. One quart or more of sweet or distilled water at a temperature of 40 C. passes through the stomach more quickly than the same amount of water at 15 C. The gastrocolic reflex is more often induced by the ingestion of warm water than by the ingestion of tepid or cold water. Sometimes the mechanism of the bile flow is influenced by the ingestion of warm water. The mucosa of the stomach absorbs water in only neglible amount.

The passage of water through the intestine is governed by the intestinal movements as well as by absorption. The movements of the small intestine produce a rhythmic kneading of the intestinal contents mixing water with food which is being digested, digestive juices, crystalloids and colloids into a thorough mixture of mechanically suspended, colloidally dispersed and physically dissolved materials. According to the metabolic gradient theory of Alvarez,[3] the peristaltic activity is intimately related to the metabolic activity of the small intestine. This theory explains the fact, which is important for the understanding of the passage of water in the intestinal tract, that the lower part of the small intestine, which is less active in digestion, carries forward the intestinal contents at a slower rate than the upper part, which is more essential for the process of digestion.

The absorbing units of the small intestine are the villi. The epithelium of the villi can be regarded as an animal membrane which will permit to a different degree the penetration of almost all the smaller molecules (broken-down foodstuffs, organic and inorganic salts) of the intestinal contents as well as of water. The play of the absorption is regulated by the following factors of physicochemical nature:[4] 1. Differences which may exist between the concentration of crystalloids (practically speaking, ion concentration) in the blood and in the intestinal contents. This difference acts in the form of diffusion pressure and drives water and dissolved salts

2. Baruch, S.: An Epitome of Hydrotherapy, Philadelphia, W. S. Saunders Co., 1920, p. 14.
3. Alvarez, W. J.: An Introduction to Gastro-Emterology, ed. 3, New York, Paul B. Hoeber, 1039, p. 146.
4. Verzar, F., and McDougal, E. J.: Absorption from the Intestine, New York and London, Longmans, Green & Co., 1936, p. 37.

from the intestine into the cells, and vice versa, according to the direction of the pressure difference. 2. The intestinal peristalsis produces a mechanical pressure (hydrostatic pressure) which drives water and, to a certain extent, dissolved salts across the epithelium into the lacteals and capillaries.[3] The colloids of the intestinal content attract water to a considerable extent; this factor greatly inhibits the absorption of water. Owing to the play of these factors, water is continuously absorbed from the intestinal contents, but watery secretion is also continuously added, with the result that the contents of the small intestine remain liquid. The epithelium of the colon plays a different role in the water and salt absorption, and the colon, especially its distal part, in which the condensation of the intestinal content into feces is taking place, must be considered to be the organ for water and salt absorption.

Absorbed water is temporarily accommodated in the tissue spaces and crevices as well as in the liver, muscles and skin. Water is lost through both renal and extrarenal routes (feces, evaporation from the skin and lungs). For an understanding of the effects of mineral water, the output of water through the kidneys, or diuresis, is of special interest.

If the extrarenal water output is taken, as unaltered and stable a definite proportion between water intake and diuresis can be observed. The ingestion of large quantities (1 liter or more) of sweet or distilled water increases the rate of the urinary output many times for the first two hours. The specific gravity of the urine falls considerably, to 1.003 and even lower. The percentage as well as the total quantity of chlorides excreted during this period is greatly reduced. The percentage of urea is also greatly reduced, although the absolute quantity excreted is increased. The *p*H of the urine becomes alkaline, the titrable acidity decreases and the ammonia production increases. After two hours the specific gravity of the urine and the excretion of chlorides increase and the water output decreases; four hours after water ingestion the urinary output return to its average rate.

II. Electrolytic Effects

Salt solutions which can be ingested without producing tissue damage can be regarded from the physicochemical standpoint as almost completely dissociated electrolyte solutions. We must consider, therefore, their physiologic effects according to the cations and anions, respectively, into which they dissociate. The same is true if salts are ingested in substance or with food. The gastric mucosa reacts only to highly concentrated salt solutions; the main field of activity for ingested salt solutions is the intestinal tract. Salt solutions reaching the small intestine exert an osmotic effect on the absorption units, the villi. This effect depends on the concentration of the solution, as well as on the physiologic response to the ions which constitute the solution. The concentration of the ingested salt solutions in relation to the concentration of body fluids can be either isotonic, hypertonic or hypotonic. If an isotonic solution is ingested, theoretically no water exchange takes place in the small intestine, and it is assumed that the salt solution is merely rapidly propelled through the entire length of the small intestine, and total or partial absorption occurs, depending on the amount of fluids and the plasma permeability of the ions in the colon. If a hypotonic solution is given, absorption of water may take place in the small intestine until the contents of the intestinal tract become isotonic. If a hypertonic solution is given, water is abstracted from the circulation and given off through the intestinal epithelium to maintain osmotic equilibrium. However, it must be emphasized that this theoretical pattern has been proved

valid only for solutions of sodium chloride; other electrolyte solutions display a different behavior.

Cushny[5] described the following experiment: Isotonic sodium chloride solution was given to a dog with cecal fistula, and it could be observed with the help of the fistula that the water as well as the salt was completely absorbed. Isotonic sodium sulfate solution was given under the same experimental conditions, and it was found that only 10 per cent of the sodium sulfate and about 20 per cent of the water was absorbed. The experiment shows clearly that the absorption of sodium sulfate is delayed by the sulfate ion (sodium in association with chloride was completely absorbed). A similar delaying action is displayed by the cations magnesium and calcium and by the anions phosphate, citrate and tartrate. All these ions are called cathartic in pharmocology because they produce a purgative effect by keeping the intestinal content fluid, not only in the small intestine but in the colon. In contrast to the cathartics, hydrogen, sodium, potassium, lithium, chloride and bicarbonate are ions which easily penetrate the intestinal epithelium. Salt solutions containing a combination of these ions will be, therefore, absorbed more or less according to the theoretical pattern mentioned.

The absorbed salt solution is carried through the circulation to the kidney and is excreted through this organ. The absorbed salts increase the flow of urine, for the kidney is unable to excrete solids except in solution, and every molecule which passes through it carries with it a certain amount of water.

It has been experimentally established that there is a great difference in the diuretic effects of sodium and of potassium, although both penetrate the intestinal wall easily. Adolphus[6] showed that 1 liter of isotonic solution of potassium chloride produces a great urinary flow, whereas the same amount of an isotonic sodium chloride solution does not alter markedly the urinary output per hour. Ingested isotonic sodium sulfate or magnesium sulfate will produce much less diuretic effect than the same salt solution injected intravenously, because only the absorbed ions have a diuretic action.

Carbon dioxide may be present in a solution in three forms: (*a*) as free gas, which escapes quickly; (*b*) as dissolved gas, which is released slowly in bubbles; (*c*) in half-bound form, when the solution contains bicarbonates. Carbon dioxide increases the diuresis and acts, according to Starkenstein, through the hydrogen ion. He assumed that only the dissolved carbonic acid, which dissociates into the ions $H \rightleftharpoons HCO_3$, produces a diuretic effect. Other gases, such as hydrogen sulfide or radon (radium emanation), do not influence markedly the urinary flow.

The action of the trace elements (ingredients detected by the spectroscope) is not yet understood, although their presence in the Saratoga waters, as Strock[7] pointed out, obviously exerts a certain influence on the physiologic action of these waters. It is assumed that the action of lithium is similar to that of potassium, and calcium to magnesium. However, the absorption of calcium is inhibited by the presence of sulfate, for the calcium ion attracts the sulfate ion and forms calcium sulfate, which is practically insoluble in water.

III. Effects of Mineral Waters

As already stated, mineral waters can be considered to be complex electrolyte solutions with or without gaseous content. It may seem, therefore, that it should be possible to explain their physiologic and pharmacologic

5. Cushny, A.: Pharmacology and Therapeutics, ed. 12, Philadelphia, Lea & Febiger, 1940, p. 274.
6. Adolphus, E.: Excretion of Water by Kidneys, Am. J. Physiol. 65:419 (Aug.) 1923.
7. Strock, W. L.: Geochemical Data on Saratoga Mineral Waters, Am. J. M. Sc. 239:857 (Dec.) 1941.

actions on the basis of studies made with plain water, electrolyte solutions and gaseous solutions. This is true with respect to the approach of the problem, but it would be erroneous to regard the problem itself as a simple arithmetical summation of elementary data, because the actions of these factors are interrelated and complex. The old-fashioned custom of considering the effect of a mineral water according to the "dominant" constituents is an oversimplification of the problem, for the other ingredients, including the other ions, may also influence the physiologic action. Only proper experimental studies carried out with the unaltered mineral water will clear up the problem in a satisfactory manner.

Experiments with mineral waters are either of the so-called "acute" type, in which a single dose of mineral water is given and the effect observed, or of the serial type, in which a certain amount of mineral water is given for a certain period. The "acute" experiment gives information about the immediate effects, while in the serial experiment an attempt is made to explain the "cure" effect.

Ingested mineral water may act in three ways: (*a*) on the digestive tract; (*b*) on the body tissues, respectively organ and tissue fluids; (*c*) when excreted, on the formation of urine and diuresis.

The action of mineral waters on the digestive tract was studied with waters known as cathartics by Zoerkendorfer, Lang, Wiechowsky and others in animal experiments and observations on human beings. These authors observed the action of hypotonic sulfate waters, such as those from the springs in Carlsbad, and hypertonic sulfate waters, such as those of Marienbad and Franzensbad, and came to the conclusion that these waters have a more marked cathartic effect than artificial sulfate solutions of the same concentration. Stransky studied in serial experiments the absorption of hypotonic mineral waters and followed the pathway of the absorbed electrolytes and water in different organs. He came to the conclusion that the absorption of the mineral water as well as the further course of the absorbed ions and water differs from that of an artificial salt solution containing the same ions in the same concentration. Danishevsky and his co-workers[8] carried out experiments on a large scale to study the effect of alkaline-earth and alkaline-saline waters on the acid-base balance. Their conclusion was that the different waters of the Caucasus exert an influence that depends not only on the sodium and bicarbonate ions but on all the ingredients constituting the waters and must be considered, therefore, as a complex effect. The influence of alkaline waters of the Vichy type on the gastric secretion was studied by Labbé and Violle;[9] they came to the conclusion that small quantities of Vichy water containing a few centigrams of sodium sulfate can neutralize hyperacid content. Fiessinger and Walter[10] made serial observations with the duodenal tube to study the effect of the magnesium waters in Chatel-Guyon on the biliary flow. They came to the conclusion that this water induces, in spite of its relatively small magnesium content, a powerful biliary flow comparable to the effect of concentrated magnesium sulfate solutions. Starkenstein studied in "acute" experiments the diuretic effect of different mineral waters and came to the conclusion that the carbonic acid content of a mineral water increases the diuretic effect in direct proportion to the dissociation of the dissolved carbonic acid, according to the formula $H.HCO_3 \rightleftharpoons H + HCO_3$. In other words, carbonic acid in solution acts as an organic acid and the diuretic efficacy of a mineral water

8. Danishevsky, G. M.: Osnoby Kurotologii, Izdatelstvo Narkomzdrave, Moskva, 1931, p. 78.
9. Labbé, M., and Violle, P. L.: Métabolisme de l'eau. Les thérapeutiques hydriques, ed. 2, Paris, Masson & Co., 1927, p. 186.
10. Fiessinger, N., and Walter, H. (Vichy): L'instantane hépatique, J. méd. franç. 23:155 (May) 1934.

can be measured by its *p*H. This statement can be accepted with reservations, because the hydrogen ion effect in mineral waters is always influenced by the other ions, especially by the sulfate, chloride, sodium, potassium and magnesium ions, and the actual diuretic effect of a mineral water will always be a complex one. Beck and Goldberger[11] studied in serial experiments the influence of hypotonic mineral waters on the renal elimination and found that drinking cures act on the acid-base balance through the increase of ammonia formation in the kidney. McClellan[12] studied the diuretic effect of Saratoga water and found a sharp swing in the urinary *p*H from the usual level of 5.0-5.5 to 7.5-8.0. Baudish[13] and later Cronheim[14] studied the catalytic activity of the Saratoga waters and came to the conclusion that the rate of activity is influenced not only by the ferrous ion but by the other constituents of the waters.

There are many other interesting and highly valuable papers dealing with the physiologic and pharmacologic actions of the mineral waters, all of which demonstrate the correctness of the statements quoted that the physiologic and pharmacologic effect of a mineral water is a complex one and that all the physicochemical properties of the water are responsible for the biologic effect.

Clinical experience is still the guide for the application of a mineral water as a therapeutic agent. This was the case with our most valuable drugs until experimental physiology and pharmacology established their scientific background; after this their field of clinical application became greatly amplified and, of course, they became more effective. Obviously, the more research work done to establish the physiologic and pharmacologic effect of a mineral water, the more successful will be its clinical application.

IV. Effects of Baths

The use of mineral baths as a therapeutic agent has been well known since ancient times, and it is a commonplace to refer to the magnificent bathing establishments of the Greeks, Romans and other ancient cultured peoples. G. R. Scott[15] in his volume "The Story of Baths," gave an interesting historical review of bathing procedures.

A consideration of the effects of the plain water bath is obviously the best approach to an understanding of the effect of the mineral bath. According to Kovács,[16] bathing procedures may exert either hydrothermal or hydrokinetic and hydrostatic effects. Water may act as a warm or cold stimulus on the circulatory system; heat and cold manipulations through the skin can more profoundly influence the distribution of blood than any medicinal measure. The capillaries of the skin are regulated by stimuli which can be influenced by hydriatic procedures in the following three ways: (1) by irritation of the nerve endings of the skin; (2) by irritation of the capillaries of the skin; (3) by irritation of the endocrine-skin equilibrium through the formation of histamine-like substances, according to Harpuder.[17] The greater the difference between the water temperature and the skin temperature, the more marked will be the irritative effect; the nearer the temperature to the "indifferent" point the less will be the irritation produced by the bath. The indifferent point for plain water is near the skin temperature.

11. Beck, M., and Goldberger, J.: Diureseversuche mit dem Karlsbader Parkbrunnen, Ztschr. f. urol. Chir. **38**:307, 1933.
12. McClellan, W. S.: Recent Chemical and Clinical Studies of the Mineral Waters of the Saratoga Spa, M. Times **71**:401 (Feb.) 1943.
13. Baudish, O.: Magic and Science of Natural Healing Waters, J. Chem. Ed. **16**:440 (Sept.) 1939.
14. Cronheim, G.: The Catalytic Action of Natural Mineral Waters, J. Phys. Chem. **45**:328 (Feb.) 1941.
15. Scott, G. R.: The Story of Baths and Bathing, London, T. W. Laurie, 1939, 186.
16. Kovács, R.: A Manual of Physical Therapy, ed. 4, Philadelphia, Lea & Febiger, 1944, p. 17.
17. Harpuder, K.: The Production of Histamine-Like Substances, Arch. Phys. Therapy **16**:23 (Jan.) 1935.

The hydrostatic pressure of the bath produces an increase of the venous pressure which results in an increase of the venous circulation, and at the same time it improves the arterial peripheral circulation by the relaxation of the muscles. The hydrostatic and hydrothermal effect of a bath depends on the duration of the bath and on the amount of water used—whether a full bath, half bath or other type of bathing procedure is employed. It also depends on the type of manipulation employed.

V. Effects of Mineral Baths

Mineral baths produce, as Kovács[16] expressed it, not only hydrothermal and hydrokinetic effects, but also hydrochemical ones. The hydrochemical effects are due to the mineral as well as the gaseous contents. It was denied for a long time that the healthy skin is able to absorb ions from the bath; however, Harpuder and his co-workers[18] gave evidence that there is an exchange between the skin and the water of the bath. The skin has the ability to give off ions into the water and take ions from the water. This exchange depends on the physicochemical reaction of the water and on the special character of the ions contained in the mineral water. Ions of the halogens are credited with a special ability to penetrate into the skin. Maliva proved experimentally that hydrogen sulfide from mineral waters can be absorbed through the skin.

Groedel and his co-workers[19] established through experimental studies the action of carbon dioxide baths. They carried out metabolic observations which showed that such baths act on the basal metabolism in the following way: While the intake of oxygen is unchanged or little increased, the output of carbon dioxide is greatly increased. This increase starts very quickly after the beginning of the bath and may last for about two hours after the treatment. The increase of the respiratory carbon dioxide is due to the fact that carbon dioxide penetrates into the body through the skin. The indifferent temperature of the carbon dioxide bath is lower than that of a plain water bath or of a mineral bath which does not contain carbon dioxide. The skin capillaries show definite dilatation, producing redness of those parts of the body which are covered by water. The minute output of the heart increases; the blood pressure increases in a full bath and diminishes in a half bath. The carbon dioxide bath lowers the pulse rate, the respiration becomes deeper, the urinary output increases. All these symptoms give us the right, as Groedel said, to compare this with the effect of digitalis on the cardiovascular system. McClellan and co-workers[20] carried out numerous experimental studies on the efficacy of the carbon dioxide baths in Saratoga Springs, N. Y., observing not only the clinical effects but the physiologic changes. The papers of McClellan and of Comstock, Hunt and Hayden[21] affirmed to a great extent the results published by Groedel.

There is little American literature about the physiologic effects of sulfur baths, although there are many sulfur spas in this country with great clinical reputation.

Baths containing radon were studied in Europe. It seems that radon has an effect on the skin capillaries similar to that of carbon dioxide. This action may explain the clinical effect of radium baths on chronic exudative lesions of bone and in cases of rheumatic diseases. In Yellowstone Park

18. Harpuder, K.: Ergebnisse der experimentellen Balneologie, Ergebn. d. inn. Med. u. Kinderh. 42:100, 1932.
19. Groedel, F. M.: Wirkung von Kohlensäure Badern auf den normalen und pathologischen Kreislauf Apparat; Fortfildungs Kurse, Dresden, T. Steinkopff, 1932, p. 108.
20. McClellan, W. S.: Balneotherapy in Circulatory Disorders, Arch. Phys. Therapy 15:366 (June) 1934.
21. Comstock, C. R.; Hunt, H. D., and Hayden, R. S.: The Value of a "Cure Regime" in the Treatment of Coronary Disease, New York State J. Med. 35:715 (July 15) 1935.

there are unusually powerful radium springs;[1] unfortunately, they are not yet in use for clinical purposes.

VI. Other Therapeutic Applications of Mineral Waters

Mineral waters may be used as gargles or nebulized and inhaled. Alkaline, alkaline-saline and earth-alkaline waters are usually used for such purposes. McClellan[22] studied the effect of Saratoga waters in combination with drugs and found that they have a local effect on the respiratory membranes and a general effect which is due to the absorption of the finely divided particles.

Mineral waters may also be used in the form of enemas and high irrigations. Mineral waters used in enemas have no specific action; they act as any other water in softening feces. In high irrigations a marked specific effect can be noticed. Mineral water is absorbed through the colon and carried through the circulation to the kidney, producing an increased diuresis. Schwarz, Goldberger and Crocker[23] studied the type of diuresis caused by the application of colonic irrigation and came to the conclusion that the diuretic effect depends not only on the quality and concentration of ions constituting a mineral water but on the pressure under which the colonic irrigation is carried out.

VII. Peloids

The use of mineral muds as a means of thermal therapy is ancient, and fine mineral mud has been used for many years wherever natural bathing facilities were present.

Peloids can be classified, according to McClellan and Singer,[24] as follows: (1) purely mineral (fango, mud); (2) mainly mineral (sea mud or liman); (3) mainly vegetable (moor, peat). Muds are used in modern balneotherapy either in mud baths or in mud packs.

Mineral mud baths are given in natural mud pools if the temperature of the bath can be kept around 96 to 99 F. The mud can be tolerated a few degrees warmer than water because the specific heat of mud is much lower than that of water. A mud temperature of 110 to 115 F. can be well borne; however, such very hot muds must be handled carefully.

Vegetable muds must be processed by being boiled with plain or mineral water. At the end of the processing the mud is a homogeneous dispersion of small particles, and the mixture has high plasticity, low specific heat and low heat conductivity. The processed mud is used for bathing purposes either in wooden bath tubs or in artificial pools.

Dry mud can be prepared by different methods for mud packs. The advantage of the mud pack is that it can be transported and used any place. Behrend[25] studied in this country the effects of fango packs and recommended them for therapeutic purposes.

The physiologic effects of mud treatments are due to the physicochemical properties of the processed mud.[26] Mineral muds act mainly through their plasticity, which enables them to be applied to any part of the body, and the radioactive substances which are usually present in the minerals contribute greatly to their efficacy. Vegetable muds are less plastic but usually have a lower specific heat than mineral muds. Also, their rich humic

22. McClellan, W. S.: Inhalation Therapy Using Mineral Waters and Medicated Oils, New York State J. Med. 44:1214 (June 1) 1944.
23. Schwarz, G.; Goldberger, J., and Crocker, Charles: Diagnosis and Treatment of Non-Operative Diseases of the Colon and Rectum, New York, Paul B. Hoeber, 1937, p. 273.
24. McClellan, W. S., and Singer, C. I.: Nature of Natural Therapeutic Agents Used at Health Resorts; Peloids, J. A. M. A. 124:426 (Feb. 12) 1944.
25. Behrend, H. J.: Fango Packs in Therapy, Arch. Phys. Therapy 17:501 (Aug.) 1936.
26. Liesegang, R. Ed.: Medizinische Kolloidlehre, Dresden, T. Steinkopff, 1933.

and resinous acid content promotes the passive hyperemia of the skin and adjacent tissues. Both types of mud cause an extreme, deep venous hyperemia not only in the skin but in those parts of the body which are covered with mud. In the course of a protracted mud treatment a considerable increase of body temperature can be observed. It is beyond the scope of this paper to discuss the differences between the action of mud and that of other heat procedures. Only two points should be mentioned here. Neither the low specific heat nor the low heat conductivity can be claimed for other heat procedures.

Practical experience has proved that mud treatments are valuable agents in the therapy of various chronic internal, surgical and gynecologic conditions. Scientific experimental work in this field is as yet in its initial stage. Some papers have been published, but the experimental results have been somewhat contradictory.

There are bathing establishments in this country, such as that at Saratoga Springs, N. Y., and several smaller places in California and elsewhere in which vegetable mud baths are given. However, the great natural wealth in mineral muds is poorly developed in this country.

Conclusions and Summary

H. E. Sigerist,[27] of Johns Hopkins University, said in his study of the American spas: "Patients for over two thousand years went to the spas, bathed in their waters, drank them and found relief. The explanations changed, but there were always results." This is true, but it does not relieve us of the task of asking for a physiologic explanation of the mode of action of the agents used in spa treatment. This ancient branch of physical medicine has been developed chiefly by clinical observation and practical experience. Hence, experimental studies have not been done to the extent that the importance of the subject deserves, and this has led to an underestimation of this valuable but traditional method of treatment. Many clinical authorities, therefore, are inclined to dismiss spa therapy as unscientific, ascribing its undeniable results to psychologic or other accessory factors. Obviously, a complete "spa cure" offers, besides the essential mineral waters and peloids, many other beneficial contributory factors, such as a change of environment, agreeable surroundings, rest and relaxation, which might act mainly psychologically. The effect of mineral waters and peloids is undeniably physiologic and can be tested by the methods of experimental physiology and pharmacology.

Research work already done on the subject proves that an approach to an understanding of the physiologic action of mineral waters and peloids is provided in their physicochemical properties. The complexity of the constituents, however, makes it a necessary prerequisite for any further progress in this field that every mineral water or peloid which is supposed to exert a therapeutic effect be tested not only by physicochemical methods but by physiologic methods. The principles of the approach to the problem as well as a few examples of experimental work already done have been briefly stressed in this paper.

219 Broadway

27. Sigerist, H. E.: American Spas in Historical Perspective, Bull. Hist. Med. 11:133 (Feb.) 1942.

SPA TREATMENT OF RHEUMATIC DISEASES IN THE UNITED STATES

RICHARD KOVACS, M.D.

NEW YORK

A spa is a health resort developed around a mineral spring or springs which makes curative use of the water in conjunction with other natural resources and physical treatment agencies, such as climate, rest, exercise and diet. The hot springs of the continent of Europe were the Meccas of rheumatic sufferers for many centuries, and much of the gradually developed system of spa therapy was built around the treatment of these patients. It is evident that the general systemic debility, vascular changes, disturbed metabolism and improper living habits and surroundings, as well as the painful inflammatory conditions of joints and soft tissues, can be particularly well benefited by the combination of therapeutic factors which well organized and medically well controlled spa treatment can offer.

Rest and Recreation

One of the chief advantages of a spa is that it removes the patient from his everyday work and worry and places him in an environment providing rest and recreation in a health-giving climate amid attractive surroundings. Chronic fatigue is one of the chief factors in arthritis; therefore, general bodily and mental rest are of great importance to the nervous, overworked, anemic patient of the rheumatoid type. Rest means more than going to bed. In a spa the experienced physician can prescribe a precise combination of rest and recreation after he has thoroughly studied the physical condition and the mental reactions of his patient.

Climate

The conception of climate includes consideration of such factors as temperature, humidity, movement of air and radiation.

It is generally recognized that rheumatic patients are sensitive to climatic and meteorologic influences. They generally feel better in a climate which is warm and sunny, where there is no dampness and no cold mist, where the subsoil is dry and where the location is sheltered against cold winds. They do not feel so well where sudden fluctuations of temperature occur, where strong, cold winds prevail and where the subsoil is damp; the humidity of enclosed valleys and that near large bodies of water are also undesirable. Rheumatic patients bathe with comfort in warm and sheltered sea pools but do not feel so well in the open sea. Besides these general effects of certain climates and situations on the rheumatic state, the influence of a sedative or stimulating climate on the general health is also to be considered. The selection of a resort located in a certain climate must depend not only on the general condition of the patient but on the season of the year. Certain locations are stimulating or sedative according to the season.

Generally speaking, for the majority of rheumatic patients, resorts situated at a level of 500 to 1,000 feet—a moderate level, where the patient is protected from extremes of temperature—are the most desirable. Many American resorts catering to rheumatic patients are in this category.

Balneotherapy

The use of natural mineral waters internally and externally, known as balneotherapy, is the backbone of the treatment regimen at the spas. In most American spas, external use of water in baths, douches and so on is generally considered the more important.

Analysis of a water throws but little light on its therapeutic action, and one must depend largely on clinical observation supplemented by the work of the biochemist. A simple classification of mineral springs to be found in the United States, according to McClellan,[1] is as follows:

1. Simple thermal springs. Springs with temperature 15 degrees (F.) above the mean average of the air are known as thermal waters. Examples are Arrowhead Springs, California (204 F.); Hot Springs, Arkansas (130 to 145 F.); Hot Springs, Virginia (106 F.), and Warm Springs, Georgia (90 to 92 F.). These waters are used—after suitable cooling—for bathing in individual tubs and pools.

Fig. 1. — Applying hot, dry pack after tub bath (Homestead Spa, Hot Springs, Va.).

2. Saline waters. These are usually cold. They can be divided into two groups: in the saline-sulfate group the sulfate radical dominates and is found combined with sodium, calcium or magnesium. Examples are White Sulphur Springs, West Virginia; French Lick, Indiana, and Sharon Springs, New York. The saline-chloride group contains a greater concentration of the chlorine radical, forming brines simulating sea water. Glen Springs, New York, and Mount Clemens, Michigan, are examples.

1. McClellan, Walter S.: Hydrotherapy and Balneotherapy, in Modern Medical Therapy in General Practice, Baltimore, The Williams & Wilkins Company, 1940, p. 345.

Combinations of saline waters and bicarbonate predominate in the waters of Saratoga Springs, New York, and Martinsville, Indiana.

3. Neutral or indifferent waters contain only traces of mineral and are represented by Poland Springs, Maine, and Mountain Valley, Arkansas.

In considering the physiologic effects of the drinking, or internal use, of mineral waters, one must appreciate that most mineral waters are very dilute solutions of salts and the water is their most important constituent. Drinking of plain water in itself promotes elimination through both the kidneys and the intestinal tract, and the saline ingredients of mineral waters in many instances serve merely to point the way the water is to take in its elimination from the system. The effect of a course of mineral water drinking may be due to purgation, cleansing of the intestinal tract and removal of toxins. This will be the effect of strong sulfur and saline waters. Or it may be due to diuresis associated with flushing of the tissues generally. With increasing recognition of the importance of "trace elements," the internal use of mineral waters by rheumatic patients should be carefully studied and evaluated.[2]

In the external application of mineral waters the effects are due to thermal, mechanical and chemical action. Thermal effects will be the same whatever the character of the water employed and will influence rheumatic conditions by improving the flow of blood, especially in the cutaneous vessels and at the periphery. Mechanical effects, while produced equally by plain water when used for douches, depend in baths on the nature of the water, strongly saline and gaseous waters producing definite effects peculiar to themselves, which merge with the chemical effects. Among the recognized chemical effects are those of the carbon dioxide content on the circulation and heart action and those of strong brines as skin irritants. In the use of mineral waters for bathing the absorption of mineral elements is not considered to have any important part in the therapeutic action. Some study was devoted to a possible result of radioactive salts in cases of chronic arthritis and hypertension, and no benefit in the clinical condition other than subjective was observed.

Physical Therapy

Physical therapy procedures form the backbone of all treatment schemes in spa regimens. Those used in the treatment of chronic arthritis are outlined in the following tabulation:

Thermal —
- (*a*) *Conductive heating*: hot tub bath, therapeutic pool, paraffin bath, mud pack, hot air douche.
- (*b*) *Radiant heating*: heat lamps, electric cabinet baths.
- (*c*) *Conversive heating*: long wave and short wave diathermy.

Mechanical —
- Rest.
- Massage.
- Exercise: active, passive, corrective.

Thermal and Mechanical —
- Whirlpool bath.
- Underwater exercise.

Counterirritant —
- Ultraviolet rays (mercury vapor lamp).
- Galvanic current.
- Ion transfer with vasodilating drugs: histamine and mecholyl.
- High frequency (Oudin) current.

Thermal and counterirritant —
- Natural sunlight.
- Carbon arc lamp.

The various hydriatic measures, some of which have already been

2. Baudisch, Oskar: The Importance of Trace Elements in Biologic Activity, J. A. M. A. 123:939 (Dec. 11) 1943.

enumerated under balneotherapy, are the most frequently used means of applying thermal effects, mild counterirritation and some mechanical effects. The hot tub bath is the simplest and most generally employed general thermal measure. It offers the added advantage that after its relaxing and supporting effect has taken place, the limbs can be moved more easily by the patient or by a trained operator. Hot water immersion also allows a combination of heat effect with gentle or vigorous friction by a stream of

Fig. 2. — Carbon dioxide gas on the skin (Saratoga Spa, Saratoga Springs, N. Y.).

water, designated as hydromassage. In many spas in recent years therapeutic pool, or underwater, treatment has been added to the older forms of hot tub baths. In some instances aromatic or resinous substances or carbon dioxide are added to increase the stimulating effect. The paraffin bath is employed for intense local heating of the extremities in cases of considerable local swelling, stiffness and pain. Hot mud or peat made into smooth plastic material is used at some spas.

Other forms of thermal applications employed are baking lamps applied to the extremities and electric cabinets for general body heating. Use of the latter is usually followed by a tepid shower and gentle rubdown. All these thermal measures may exert sedative effects as well as stimulation of circulation and metabolism, according to the form, intensity and duration of heating as well as according to the individual response of the patient.

Massage and movement are the other physical measures most often employed in spa treatment of arthritis, and are used chiefly in combination with heat. While the tissues are warm, local muscular or fibrous induration may easily be softened or broken up. General massage is of value in overcoming the feeling of fatigue, in strengthening the muscular system and in soothing the nervous system. Local massage is combined with passive and later with assisted active movements of the affected joints; still later, active local and general exercise should be employed, together with corrective body

exercises, as part of the regular spa routine in suitable types of chronic arthritis.

Among special counterirritant and other physical measures available in spa treatment are heliotherapy, natural and artificial galvanic baths and colonic irrigation. As a matter of fact, up-to-date physical therapy departments in spas should be able to offer all recognized forms of physical treatment; these must be prescribed by well informed spa physicians and applied by competent technicians.

Effects of Spa Treatment on Rheumatic Conditions

The position of a modern health resort is midway between the home and the hospital. It is not a diagnostic clinic or a research institution but a place for patients who will be benefited by a combination of physical treatment, climate, diet and psychotherapy. . Such a combination is most suitable in many cases of rheumatism, and this is why most health resorts emphasize that they treat arthritis and rheumatic conditions. Some of them even profess to specialize in the handling of such conditions. It is, however, evident that not all types of rheumatism will respond to spa therapy and that no spa treatment method has a specific curative effect on rheumatism. Unless the principal factors in the success of a health resort are available, and no single therapeutic agent is relied on, the sending of a patient to a distant

Fig. 3. — Treatment in thermal physical therapy pool (Hot Springs National Park, Hot Springs, Ark.).

spa will not be justified. The presence of an ideal climate and a well equipped hydrotherapeutic department are not sufficient unless the patient gets the benefit of competent medical direction and trained technical assistance. He must also have suitable hotel accommodations and appropriate diet, and the general atmosphere of the resort must be conducive to rest and relaxation. All of this must be available within his financial means.

So far as the selection of types of rheumatism suitable for spa treatment is concerned, it appears to be the consensus that patients in the active stage

of the disease, especially of rheumatoid arthritis, do better at home or at an institution at prolonged rest. The exertion of taking treatments in a spa would far outweigh the possible benefit derived therefrom. After the acute stage, rheumatoid patients may be sent to a warm, dry region, where, in addition to suitable rest, heliotherapy, diet, balneotherapy and hydrotherapy may be carefully applied. Too intense heating must be avoided at all times.

Osteoarthritis is generally more suitable for spa treatment. Patients are usually past middle age, are often overfed and obese and have various degrees of arthritic changes in some of the weight-bearing joints. They cannot change their mode of living or the abuse of their joints in their home surroundings. Such patients often do exceedingly well by "taking the cure," which consists of thermal measures, massage, judiciously restricted exercise, suitable diet and rest from business worry or nagging relatives. In addition, any existing strain on the heart and the general circulation can be beneficially influenced, and after a sojourn of several weeks these patients return home literally rejuvenated. No wonder that patients of this type return faithfully to their favorite spas for a renewal of the spa regimen and keep comfortable even though roentgenograms of their joints show the usual slow progress of the degenerative changes.

Similar considerations prevail in the employment of spa treatment of soft tissue rheumatism, chronic myositis, fibrositis, brachial neuritis and sciatica which have proved resistant to treatment at home. Patients with chronic traumatic and gonorrheal arthritis, gout and other forms of metabolic arthritis usually do exceedingly well with a combination of intelligent medical management and individualized physical therapy.

American Spas

No other country in the world is so richly endowed with natural resources and variety of climate as the United States. But when the requirements laid down for an ideal spa are applied to many of its health resorts, they are found to be inferior to the well organized health resort abroad.[3] The British Spa Federation in 1938 laid down the following requirements for membership in its body:

1. The possession of natural mineral waters which possess a definite therapeutic value.
2. The existence of sufficient bathing and hydrotherapy pump room accommodation.
3. The residence in the particular town of medical men who specialize in spa treatment.
4. Suitable hotel and boarding house accommodation.
5. Treatment must be given under the direction of properly qualified medical men.
6. The amenities and sanitary conditions of the town must be duly approved by the Federation.
7. The spa must be under municipal or other approved control.
8. The chief activity of the spa must be the provision of facilities for spa treatment.

Only a few American resorts have any sort of history or tradition, and many of them have sprung up at the site of an accidentally discovered mineral or hot water spring, where a lay owner has erected a few primitive shacks which can be called bathhouses only by courtesy. There are no recreational facilities, and no effort is made to improve the landscaping around the shacks of which the resort consists. Dozens of such would-be springs of health, strewn over the American continent from the Empire State to the dry lands and valleys of New Mexico, to Wyoming and to California, are visited year in and year out by simple folk suffering from a variety of

3. Kovács, Richard: American Health Resorts: The Problem of the American Spas, J. A. M. A. 127:977 (April 14) 1945.

ailments, chiefly rheumatic. Neither the average American nor most of his physicians have been educated by years of tradition in making the best use of treatment in a resort. The average American citizen often goes off to a resort of his own choice and when he gets there does not seek a physician's advice as to what water to drink and what baths to take. He resents being asked to undergo a medical examination before taking the cure and seems satisfied that all there is to it is a course of twenty-one baths, although there is no scientific foundation for such belief.

On the other hand there are a number of American spas whose facilities and medical direction are comparable to those of the best health resorts abroad. Some of these have been taken over for the duration of the war for the military rehabilitation program. It is to be hoped that this utilization will serve as a potent stimulus for more effective and more general postwar use.

In subsequent articles general information about the representative American Spa resorts and specific facts about the care of rheumatic patients there will be presented. This material has been furnished through the cooperation of the medical directors and, in the case of Hot Springs, Arkansas, by the superintendent. No data will be included about places closed "for the duration" or under operation by the armed forces.

EDITOR'S NOTE: This is the first of three articles, of which the other two will also appear in the ARCHIVES.

THE CHALLENGE OF CRUTCHES

III. Standard Crutch Gaits and How to Teach Them

GEORGE G. DEAVER, M.D.

Medical Director, Institute for the Crippled and Disabled

and

MARY ELEANOR BROWN, M.A.

Physical Therapy Technician, Institute for the Crippled and Disabled

NEW YORK

All crutch walkers should learn at least two gaits: a fast one to be used in the open for making speed, as is needed in crossing a street, and a slow one for crowded places, where space is limited but balance must be kept as slow progression is made. However, a subject should be taught as many crutch gaits as he can master. He should know more than one because each crutch gait requires a different combination of muscles, and a disabled person who becomes fatigued with one may change to another and thus allow one group of muscles to rest while he puts another to work. Also, each crutch gait can be used as an exercise. Thus all possible locomotion muscle groups may be strengthened.

There are a number of somewhat standard crutch gaits which are easy to understand and to learn. It is interesting, however, to note that not all crutch walkers use standard gaits. In fact, there are innumerable individual gaits which crutch walkers develop, sometimes consciously but usually unconsciously. There was the boy nicknamed "the flying Dutchman," whose

gait was so speedy and intricate that it would be impossible to analyze it except through slow motion pictures. Some gaits are just as inefficient as the "flying Dutchman's" was efficient. Subjects may plod along, using their crutches so clumsily that they are rather hindered than helped by them. A sure indication that a person does not know how to manage crutches is his inability to move one crutch without first adjusting the other in some way. This makes for instability and uncertainty, and if the subject was asked where his weight was concentrated at a given moment he would almost surely be without an answer.

Disabled persons who are inclined to complain that they cannot be expected to learn such and such a gait should see the man who, while capable of doing a good two point alternate crutch gait, could also walk without touching his feet to the ground. He was severely disabled in the lower extremities, but his upper extremities and shoulder girdle were so powerful and so sensitive to the crutches and to his balance on them that he could control the crutches from the shoulder and literally take steps with his shoulders. There is an important lesson to be learned from such a performance. Subjects devoid of sensation below the waist, as in some spinal cord injuries, often contend that they cannot feel their feet on the ground and therefore must not be expected to keep their balance. They can definitely learn to become aware of balance if they are willing to develop sensitivity of the armpits, of the rib cage below the armpits, against which the crutches lean, and of their whole upper extremities. Sensation for balance can thus be highly developed with sufficient practice.

There was the case of the beautiful young blonde girl who had no physical reason for using crutches so far as could be ascertained by physicians. Yet she could not walk without them. She was one of the psychologic and hysterical subjects.

A young man with cerebral palsy affecting both lower extremities was often seen stumbling along in the manner characteristic of cerebral palsy spastic paraplegia subjects, with both crutches held out in front of him. There is a reason for this. Such subjects suffer greatly from the fear of falling, and the crutches give them assurance that should they lose their balance they can catch themselves with the crutches.

Then there will always be those who, for personal or economic reasons, at the call of fire will forgetfully heave both crutches in the air, or tuck them under an arm, and be on their way fast and furiously to the scene of the conflagration.

A. Standard Crutch Gaits

1. Point and Sound Systems

The various standard crutch gaits differ in the combination of crutch and foot or crutches and feet in taking steps and in the sequence of these. Some of the standard crutch gaits have been named as follows: two point, three point and four point crutch gaits. They have also been called two count, three count and four count gaits. This has been taken to mean the number of points contacting the floor during a performance of one step. This assumption is logical in the case of the two and four point gaits, but in the so-called three point gait the two crutches and the weaker limb contact the floor simultaneously while the next step is made by the stronger extremity alone. It would seem that this should be called a three point and one point gait. It is possible to establish the meaning of "point" as signifying the number of sounds made on the floor in the course of taking a step with one limb and then the other. However, the name of the crutch

gait is immaterial if the combination of crutches and feet and the sequence of the gait are known.

In the following description of common crutch gaits, the crutch-foot sequence is given immediately after the name of the gait. It is assumed in all cases that the crutch student takes a good stance before attempting any of the gaits.[1]

2. Description of Gaits and How to Teach Them to Individual Subjects

(*a*) *Four Point Alternate Crutch Gait.* —

CRUTCH-FOOT SEQUENCE

(1) Right crutch
(2) Left foot
(3) Left crutch
(4) Right foot

The four point alternate is the most elementary standard crutch gait and consists in advancing one crutch, then the opposite foot, then the other crutch and finally the other foot. At all times there are three points of support on the floor while one crutch is in the air.

The four point alternate gait is a simple gait if there is a method of getting one foot ahead of the other. It is a safe gait because there are always three points of support on the floor. It is a slow gait because weight must be constantly shifted. It does not require a great deal of space, so that it is a good gait to use in crowds or where space is limited.

The best way to teach a crutch gait is to analyze it into its elements and then teach the subject one element at a time until he can perform each one perfectly, first against the wall and then away from the wall.

Before teaching the subject the gait itself, it is advisable to have him do a drill of the elements of the gait, first while standing against the wall and then away from the wall. A four point alternate gait drill follows:

Four Point Alternate Gait Drill

Purpose: To prepare for the four point alternate gait.

Position: Standing correctly with weight distributed evenly between the feet and crutches.

Instructions: Sway to the right, taking the weight onto the right crutch and freeing the left crutch. Lift the left crutch and place it ahead 4 inches. Replace it, keeping the weight distribution the same. Center weight. Sway to the left side. Raise the right foot. Place it ahead four inches. Replace it, keeping the weight distribution the same. Center weight. Repeat for moving the right crutch, then the left foot.

A crutch walking beginner should always keep his crutches ahead of him and should be careful to take small steps at first.

(*b*) *Two Point Alternate Crutch Gait.* —

CRUTCH-FOOT SEQUENCE

(1) Right crutch and left foot simultaneously
(2) Left crutch and right foot simultaneously

Once the four point alternate gait has been mastered, the subject may be taught next the two point alternate which involves placing one crutch and the opposite foot down on the floor simultaneously, then the other crutch and the other foot simultaneously. This is no more than a speeding up of the four point alternate gait.

This is a faster gait than the four point; in fact, there are persons using this gait who can walk as fast as an average normal walker making good speed. It requires more balance control than the four point alternate gait

1. Deaver, George G., and Brown, Mary Eleanor: The Challenge of Crutches: II. Crutch Walking: Muscular Demands and Preparation, Arch. Phys. Med. 26:515 (Aug.) 1945. (See "Preparation for Crutch Walking," subhead "6. Standing Exercises with Crutches," page 524).

because only two points are supporting the body at one time. It does not require a great deal of space.

(*c*) *Three Point Crutch Gait.* —

CRUTCH-FOOT SEQUENCE

(1) Both crutches and the weaker lower extremity
(2) The stronger lower extremity

The three point crutch gait is the one in which the two crutches and the weaker limb are placed on the floor simultaneously, then the stronger limb, which, being strong enough to support the weight of the body, needs no crutches. This gait is used by those having one lower extremity which cannot take full weight bearing and one which can support the whole body weight. Both crutches are employed with the weaker lower extremity while the stronger one takes the whole body weight with no need for crutch aid.

(*d*) *Tripod Crutch Gaits.* — There are two tripod gaits. We are naming them for convenience the tripod alternate gait and the tripod simultaneous gait.

Tripod Alternate Crutch Gait:

CRUTCH-FOOT SEQUENCE

(1) Right crutch
(2) Left crutch
(3) Drag body

The tripod alternate gait has been described as follows:[2]

> If the crutches are placed apart and slanted well forward at their lower ends, they form the two anterior points of a tripod, while the third and posterior part of the tripod is formed by the body of the patient inclined forward at its upper part, with the feet well behind. The apex of the tripod thus comes at the shoulder level of the patient, his body and legs forming the posterior support of the tripod, and the crutches the two anterior supports. Such a position is stable because (*a*) the base of support is a large triangle bounded by the three points of support of the tripod and (*b*) the body is stable in the over-extended position because hyperextension of the hips is checked by the "Y" ligament of Bigelow, and, with the knees stiffened by the braces, the center of gravity falls in front of the hip joints and keeps them extended and firm. A paralyzed patient with no power below the waist can stand unsupported easily in this position, provided there are no contraction deformities in the hip, knee or ankle.
>
> The patient must next be taught confidence in this position. If he has been long confined to his bed or chair he will in large measure have lost his sense of upright equilibrium, which must be dealt with by itself and restored by repeated practice in standing on crutches with support near at hand, or by standing with both hands resting on the foot rail of the bed. When he has sufficiently acquired the sense of balance to have self-confidence, he should begin on progression. This is accomplished by hitching one crutch a few inches forward, then the other crutch, and then, in cases of complete flaccid paralysis, jerking the feet forward together a few inches by a body movement, bearing down with the hands on the crutch bars and sliding the feet over the floor. . . .
>
> The one essential in bad cases is that the tripod should have a large base, and the body be sufficiently inclined forward to keep the center of gravity in front of the hips. If it falls behind them the patient will double up backward like a jack-knife on account of flexion of the hips.

Tripod Simultaneous Crutch Gait:

CRUTCH-FOOT SEQUENCE

(1) Both crutches
(2) Drag body

The tripod simultaneous gait differs from the tripod alternate gait in that the two crutches are placed on the floor at once. The body is jerked,

2. Lovett, Robert W.: The Tripod Method of Walking with Crutches, J. A. M. A. 74:1306 (May 8) 1920.

dragged, or slid along the floor and the crutches are lifted once more. This becomes the gait described by Wilhemine Wright[3] as "a sort of rocking backwards and forwards between crutches and feet."

The tripod gaits are slow, labored gaits for severely disabled subjects who have spastic or flaccid paralysis of the lower extremities. They are the crutch gaits of choice to start those with spinal cord injuries. In fact, they will discover the tripod alternate gait themselves even if they have not been taught it, provided their determination to walk is strong. However, it would be the rare disabled subject with good upper extremities and shoulder girdle who could not learn a better gait, even though he might not feel confident enough to swing through his crutches. The young boy, Arnold S., previously referred to,[4] was born with flaccid paralysis and anesthesia below the waist and performed a flawless swinging-through gait.

The tripod alternate gait should not be encouraged except as a last possible resort. Once a subject gets the habit of using it, he is reluctant to learn another gait. Moving one crutch at a time with the body jerking in between is an awkward, tiring and obstinate habit if breaking it becomes desirable. The tripod simultaneous gait is the one to be encouraged, since its rhythm is essentially that of the swinging gaits.

The tripod gaits are slow, labored and precarious and lack grace. They should not be used unless no other gait can be achieved. Since they do not take much space, they may be used by any crutch walker when circumstances make it impossible to maneuver the crutches in any other way.

(*e*) *Swinging Crutch Gaits.* — The swinging gaits are interesting to analyze. There are two variations, the swinging-to gait and the swinging-through gait.

Swinging-To Crutch Gait:

Crutch-Foot Sequence
(1) Both crutches
(2) Lift and swing body to crutches

The swinging-to gait is the easier and consists in the subject's placing the two crutches simultaneously in front of the body, bearing down on the crutches and lifting the body so that it moves up to the crutches.

Swinging-Through Crutch Gait:

Crutch-Foot Sequence
(1) Both crutches
(2) Lift and swing body beyond crutches

The swinging-through gait is the more difficult one, because the body is swung through the crutches and lands on the ground ahead of them. The crutches are then placed in front of the body and the gait is continued.

When the swinging gaits are analyzed into elements, the following steps emerge: The subject lifts both crutches by rocking backward and puts them down ahead of him, pushes down on the crutches, straightens his arms, raises his body and moves it forward. These elements can be made into drills as follows, to be done first against the wall and then away from the wall:

Swinging Gait Drill No. 1: Raising Both Crutches.

Lift both crutches and put them down again in the same place. Repeat.

Swinging Gait Drill No. 2: Raising Both Crutches and Moving Them.

Lift both crutches and put them down a little ahead of where they were. Repeat, always moving a little farther out in front. When out as far as possible go backward in the same manner.

Swinging Gait Drill No. 3: Raising Body from Floor.

Push down on the crutches, straighten the elbows and raise the body weight off

3. Wright, Wilhemine G.: Crutch-Walking as an Art, J. Surg. 1:372 (Dec.) 1926.
4. Deaver, George G., and Brown, Mary Eleanor: The Challenge of Crutches: Methods of Crutch Management, Arch. Phys. Med. 26:397 (July) 1945.

the floor so that the feet no longer touch, keeping the shoulders down. Let the body down easily. Rest, repeat.

The additional element in the swinging-through gait is swinging the body through the crutches. This is difficult because the crutches have to be behind the body. The following drill is given to prepare the subject for this phase:

Swinging Gait Drill No. 4: Placing Crutches Backward.
(The subject should stand a little away from the wall or with some one behind him.) Lift both crutches and place them forward, lean on them, push off backward, raising the crutches, and place them back of the body being sure that they slant backward away from the body at an angle. Repeat.

This is such a hard part of the swinging-through gait that the subject often needs to be securely held at first; a therapist takes the crutches and places them forward and backward for the subject, and another therapist moves his body.

Some of the difficulties that disabled people have with these swinging gaits are important enough for elaboration. The beginner should be made aware of the fact that he really deliberately loses his balance forward, is caught by the crutches, moves his body, and then rocks backward in order to lift the crutches preparatory to placing them ahead to take another step. If the crutches are not out there in front of him and slanting away from him to catch him, he will, of course fall. A similar precaution needs to be taken when the crutch walker begins learning swinging gait drill No. 4 for placing crutches backward, preparatory to the swinging-through gait. The crutches when back of the body must slant away from the body.

In learning the swinging-to gait, which requires that the body be brought up only to the crutches, beginners often experience instability at the time when the body has been advanced to the crutches. A necessary step in the instruction procedure is to teach them to be ready immediately to raise the crutches and put them forward before resting. The actions should be on a count of three, as follows:

(1) Lift both crutches and put them down in front of their initial position.
(2) Push down on the crutches and raise the body off the floor, bringing the body up to the crutches.
(3) Immediately lift both crutches and place them on the floor ahead.

The sequence should be done as a unit and followed by a rest period. Eventually the rest period is eliminated and a smooth swinging gait performed.

Severely disabled persons when first learning the swinging-to gait will take tiny steps and tend not to advance to the crutches. This may be due to fear or to lack of strength in the upper extremities sufficient to keep the body raised off the floor long enough for a larger step. The fear element can be overcome by practice and the weakness by exercises for the upper extremity especially devised for developing strength in the crutch-walking muscles.

If there is no muscle power across the back of the hip joints, the subject must be taught to keep the hips forward as far as possible with the back arched. Otherwise he will have nothing with which to catch himself in the back if he bends at the hip joints, and he will jacknife backward, land on his pelvis, with possible serious injury. The body should be stiff, the back arched and the pelvis forward before the feet touch the floor.

In fact, it is incorrect, even when muscular power allows, to have the pelvis protruding or raised in the back. Many people commit the error of failing to lean forward with the pelvis when they place the crutches in

front of the body and press on them. At this moment the body should be fully elongated even to the point of the pelvis being farther forward than the rest of the body. Constant prompting of the subject helps. The teacher should also place her hands on the back of the subject's pelvis and push it forward as he leans on his hands with the crutches in front of him and makes his own offorts to get his pelvis forward. Such difficulties with the position of the pelvis are often noted in cerebral palsy of the spastic type.

Another error which is often made by boys and girls with cerebral palsy of the spastic type is to bend the knees and hips while attempting a swinging-through gait. This results in an awkward gait and defeats the purpose of using the swinging-through gait, since the speed cannot be attained which really justifies learning it in the first place. The reason this error is made is that the upper extremities are not strong enough to take the weight of the body. Therefore, the knees must bend to get the feet off the floor while the subject is swinging through. Such difficulties would be an indication for concentrated exercise of the upper extremities to strengthen them so that they could be used in a good swinging-through gait.

Rhythm is to be encouraged, especially in the swinging gaits, since the movement can be smooth and graceful and not tiring if the subject can get past the frightened stage. Miss Wright's[5] description of the swinging gait gives hints as to how to attain a graceful swing:

> In the swinging method of crutch walking, the patient must keep his crutches close to him so that they are nearly vertical when he supports himself on them. As he lifts his feet from the floor he must contrive to upset his balance forward, catching himself on his feet, which must be thrown well ahead of the crutches. The forward impetus continues after the feet touch the ground and the whole body pivoting on the feet starts to fall forward, but is caught on the crutches, which are swung forward in time. Many patients make the mistake of leaning with finality on the crutches, so that a special effort must be made to start the swing of the legs again. The walk looks like a series of disconnected hops. There is a great saving in strength and gain in speed and grace (for it is possible to be graceful on crutches) if the tap of the crutches on the floor is made use of to propel the feet forward again.

The swinging-to gait, in which the subject merely brings his body up to the crutches, is a slow gait and cannot be used successfully for speed. The swinging-through gait, in which the body is swung through and beyond the crutches, is a very fast one. Greater speed can be made with this crutch gait than can be attained by a normal person in walking. With certain disabilities, such as lack of muscle power across the back of the hip joints, this is a precarious gait, since it is a series of forward falls interrupted by having the crutches behind the body. However, if mastered it can be a stable gait because there is a tripod-like support given by the two feet as one support, and the two crutches as the other two, whether the crutches are in front of the body or behind it. It is an efficient gait, as the momentum accumulated by the falls saves muscular energy. Also, it has the advantage of allowing the body to be suspended with no weight on it, subject beneficially to the pull of gravity. At times of suspension there is no weight to be borne by the lower extremities or the trunk and the whole body is elongated downward. Thus, spinal curves and weak trunks benefit by this gait.

(*f*) *Rocking Chair Crutch Gait.*—

CRUTCH-FOOT SEQUENCE

(1) Both crutches
(2) One foot
(3) Other foot

In the rocking chair gait the subject places the two crutches on the floor

5. Wright, footnote 4, page 373.

ahead of him and rocks through them, stepping with one foot and then the other, after which he advances the crutches again and continues to walk through. The body may or may not be lifted off the floor as in the swinging gaits.

In the case of the four, three and two point gaits, the disabled person, as can be seen, has the advantage of possible weaning from the crutches if this is found desirable, since he can be taught to bear down less and less on the crutches and finally to discard one at a time. In the case of the rocking chair gait, however, this cannot be done, because the subject learns to bear down all at once on the crutches and to take little weight on the feet as they rock through. This gait is used only when all others are impossible, as is the case in deformities in the hip, knee and ankle, as well as of the trunk, which occur in such diseases as arthritis of the spine.

(g) *Amputation Crutch Gaits.* — There is a crutch gait often used by artificial limb walkers which, although not recommended, nevertheless is common enough to name and describe:

Two Point Amputation Crutch Gait:

CRUTCH-FOOT SEQUENCE

(1) Right foot and right crutch simultaneously
(2) Left foot and left crutch simultaneously

When a subject has artificial limbs he does not need additional support, since his limbs are strong enough to support him. All he needs is something with which to catch himself if he loses his balance. Therefore, he takes a step forward, simultaneously placing the crutch on the same side down on the ground, in order to prevent himself from over-riding the mark and pitching forward or sideward. Then he follows by taking a step with the foot and the crutch on the other side. The crutches are employed less and less as balance is achieved on the artificial limbs. Since there is little mechanical or anatomic justification for this gait and those who use it should really be walking with canes, this crutch gait is not recommended to the artificial limb walker and will not appear in any of the crutch gait prescriptions.

As will be seen in the forthcoming article on the prescription of crutch gaits for orthopedic disabilities, the four point alternate and the two point alternate crutch gaits are taught to amputation subjects.

Even though artificial limb walkers do not require special crutch gaits, their methods of handling crutches differ from the manipulation of crutches by those with extremities impaired by paralysis. The aim also is different. The subject with artificial limbs is supported by his artificial limbs. He does not need the crutches for support. He needs them for balance. The aim is to use crutches at first for balancing purposes until the subject has got the feel of his artificial limbs. If there is one artificial limb, either below or above the knee, the subject can soon learn to do away with all crutches or canes. If there are two artificial limbs below the knee, also, he can eventually learn to do without crutches or canes. If there have been two amputations, one above and one below the knee, or two amputations above the knee, crutches are needed at first but may be supplanted eventually by two canes. Sometimes, but rarely, one cane may be sufficient. Such subjects can learn to walk without crutches or canes when they are in familiar surroundings where there are objects or furniture to hold onto. They have no muscles across the knee and ankle joints to use to right themselves if the trunk's center of gravity should get behind or in front of the artificial

limbs. Therefore, it is too precarious for them to be without canes or crutches out in society.

Even though the use of crutches and the aims of crutch walking in the case of artificial limbs are different, the elementary first steps are the same. The subject must still learn to use crutches, even though eventually they are to be discarded. There is need for strong upper extremities, as well as daily periods of crutch-balancing against a wall at first and then in the center of the room. All the pre-crutch-walking exercises which have already been suggested should be practiced.[1]

The difference in teaching comes at the first step. The artificial limb walker should use a chair at first to get the feel of his artificial limbs while stepping forward. He should practice against the wall at first and then push the chair by holding onto the back of it until he becomes used to the joint action of his artificial limbs. If he has one artificial limb above the knee, he should be taught at the outset to bend it at the knee at each step. If he has two artificial limbs above the knee, he should be taught to lock the knee on the side of the poorer stump and keep it locked while walking, but to bend the other at each step.

The gait for artificial limb walkers to learn is one which never for a moment leaves them carrying most of the weight on their crutches. An example of a gait to be avoided is the rocking chair gait, in which the subject places the two crutches ahead of the body, leans on the crutches and walks through. If this gait is learned, the subject becomes dependent on his crutches and cannot easily be weaned from them.

The best crutch gait to teach a beginner on artificial limbs is the four point alternate gait. The instruction is to take as little weight on the crutches as possible. This gait can be speeded up to a two point alternate gait and then the same gait transferred to canes. Some subjects can learn to use only one cane, but this is daring and is not recommended for use out in society. As an exercise to improve confidence and ability to manipulate the artificial limbs, it is a good activity, as is learning to walk without canes or crutches.

B. Instructing Prospective Teachers or Groups of Disabled Subjects

When prospective teachers are instructed in crutch gaits, it is essential that each one take a pair of adjustable crutches in his own hands, adjust them to suit his height and the length of his upper extremities and proceed to get acquainted with crutches. The next step is actually to perform all the pre-crutch-walking exercises and drills and the crutch gaits. In fact, these need to be learned so carefully that a rigid practical examination can be passed on any phase of the teaching of crutch walking.

The best way to teach groups either of prospective teachers or of disabled subjects is to supply each student with a pair of crutches adjusted to fit him. Then line up the group against a long wall with plenty of space between each member. The exercise is explained and demonstrated by the instructor, who also has a pair of crutches. After the members of the group have practiced individually for a few minutes, the instructor stands in front of them and gives directions to the whole group, which performs in unison. The teacher should demonstrate with crutches as instructions for each part of the exercise or step of the gait is given. The pre-crutch-walking exercises, as already described, should be done against a wall at first and then away from the wall, in the sequence given.

Counting vocally or by metronome or use of music or any other kind of rhythm may be employed as an accompaniment to crutch exercises and walking. In the absence of a piano, a tom-tom, tambourine or Cuban maracas

may be used to keep time. A simple exercise for a group on crutches is to lean against the wall with space on each side and, on the beat of the tom-tom sway to one side, transferring all of the weight from one crutch to the other and holding it there while the maracas are shaken for three counts. The sequence is as follows: Sway to one side, two, three, four; sway to the other side, two, three, four. Another exercise is to step away from the wall and on the beat of the tom-tom move both crutches several inches in front and lean on them. Hold them there for three counts indicated by shaking of the maracas, and then on the count of one, the next beat of the tom-tom, pick up the crutches and place them several inches back of the body.

An infinite number of simple exercises, rhythmic or otherwise, can be devised according to the individual problems of the subjects. It has been found successful to spend twenty minutes out of every hour's instruction period on hard drill on crutch-balancing exercises, finishing up with a short rhythmic drill.

Teachers of crutch balancing and crutch walking need to learn to do the exercises themselves before they can be successful teachers.

EDITOR'S NOTE: Subsequent articles in this series will also appear in the ARCHIVES.

ARTIFICIAL FEVER-CHEMOTHERAPY *

V. Induction Period

R. M. CRAIG, PASSED ASSISTANT SURGEON (R) U. S. P. H. S.

Instructor in Dermatology, University of Illinois College of Medicine

F. M. BUROKER, ASSISTANT NURSE OFFICER (R) U. S. P. H. S.

Chief Fever Technician

and

G. X. SCHWEMLEIN, PASSED ASSISTANT SURGEON (R) U. S. P. H. S.

Fellow in Medicine, Northwestern University Medical School

CHICAGO

Physically induced fever has been successfully employed as an adjuvant measure in the therapy of large numbers of patients with syphilis and gonorrhea.[1] The experience gained in administering therapeutic fever has resulted in an intramural organization[2] and routine measures which have increased the safety and comfort of the patient.

Considerable emphasis should be placed on details of the technic employed for the induction of therapeutic fever. Preparation of the equipment must be completed before the institution of treatment.

* From the Section on Fever-Chemotherapy, Chicago Intensive Treatment Center, Venereal Disease Control Program, Chicago Board of Health, in Cooperation with the United States Public Health Service.

1. Bundesen, H. N.; Bauer, T. J., and Kendell, H. W.: The Intensive Treatment of Gonorrhea and Syphilis, J. A. M. A. 123:816 (Nov. 27) 1943.

2. Schwemlein, G. X.; Kendell, H. W., and Craig, R. M.: Artificial Fever-Chemotherapy: III. Charting Procedures, Arch. Phys. Med. 26:8 (Jan.) 1945.

Preparation

Preparation of Fever Cabinet. — The hypertherm[3] must be warmed before the patient is brought to the fever unit. The mattress must be placed toward the head end of the cabinet and the covering blankets tucked in securely at the sides, as loose-fitting blankets may block the circulation of air from the air-conditioning compartment of the cabinet. The hinged cover of the cabinet is closed and the head pillows placed firmly over the neck opening to prevent loss of heat and decrease in percentage of humidity of the circulating air inside the cabinet. The electric supply cable is connected and the cabinet control element turned to its maximum point — 80. The main switch is then turned to "on" position.

The water bottle at the foot end of the cabinet should be completely filled before the cabinet is warmed. Should refilling be necessary during treatment, it should be done before the bottle is completely empty. Cold water should not be used, as it may change the cabinet air temperature. Water containing high mineral concentration if used repeatedly may cause an accumulation of lime in the humidifier pan, and therefore is to be avoided.

The cabinet is considered ready to receive the patient when the cabinet temperature reading reaches 120 F. The time required for this warming depends on the temperature of the room. There may be seasonal variations unless the fever department atmosphere is controlled. The average time required for this procedure is approximately forty minutes.

Preparation of the Patient. — The patient, who has received a thorough diagnostic survey[4] and adequate prefever preparation,[5] is now admitted to the fever unit. He is asked to be seated on a chair beside a low table while the blood pressure is taken on the left arm.[6] In this position blood specimens for immediate pretreatment serologic tests for syphilis[7] and specific gravity of the plasma may also be obtained.

The patient is asked to remove his hospital clothing and to support a large towel over the genitalia. Female patients are instructed to hold the towel to cover the chest and genitalia.

The bulb of the rectal indicating thermometer, which is in "off" position, is placed through the right side door after the cabinet thermometer has reached 120 F. A rectangular slot 2½ by 1 cm., cut in the lower part of the door, will accommodate the cable, allowing the door to be closed. The pillows are then removed from the neck opening and placed in the pillow support at the head of the cabinet. A folded towel is placed lengthwise across the pillows.

Induction Period

The induction period is defined as the interval required to elevate the patient's rectal temperature within 0.2 degree (F.) of the desired maintenance level.

The hinged cover is unlatched and raised to "open" position. The patient is asked to recline on the mattress on his right side, with his head on the pillows, flexing his left knee.

The end of the bulb of the rectal indicating thermometer is covered

3. Krusen, F. H.: Physical Medicine, Philadelphia, W. B. Saunders Company, 1941, p. 47. Stokes, J. H.: Modern Clinical Syphilology, Philadelphia, W. B. Saunders Company, 1944, p. 350. Moore, J. E.: The Modern Treatment of Syphilis, ed. 2, Springfield, Ill., Charles C. Thomas, 1943, p. 397.
4. Kendell, H. W.; Craig, R. M., and Schwemlein, G. X.: Artificial Fever-Chemotherapy: Contraindications, to be published.
5. Schwemlein, G. X.; Kendell, H. W., and Craig, R. M.: Artificial Fever-Chemotherapy: IV. Prefever Preparation and Postfever Care, Arch. Phys. Med. 26:329 (June) 1945.
6. Standardization of Blood Pressure Readings (Joint Recommendations of the American Heart Association and the Cardiac Society of Great Britain and Ireland), Am. Heart. J. 19:95 (July) 1939; J. A. M. A. 113:294 (July 22) 1939.
7. Simpson, W. M.; Kendell, H. W.; Rose, D. L.: Quantitative Serologic Studies in Early Syphilis, Ven. Dis. Inform. 23:403 (Nov.) 1942.

with a small amount of lubricant (K-Y jelly), the patient is asked to take a deep breath and the bulb is inserted just within the external anal sphincter.

Attention must then be directed to balancing the rectal indicating ther-

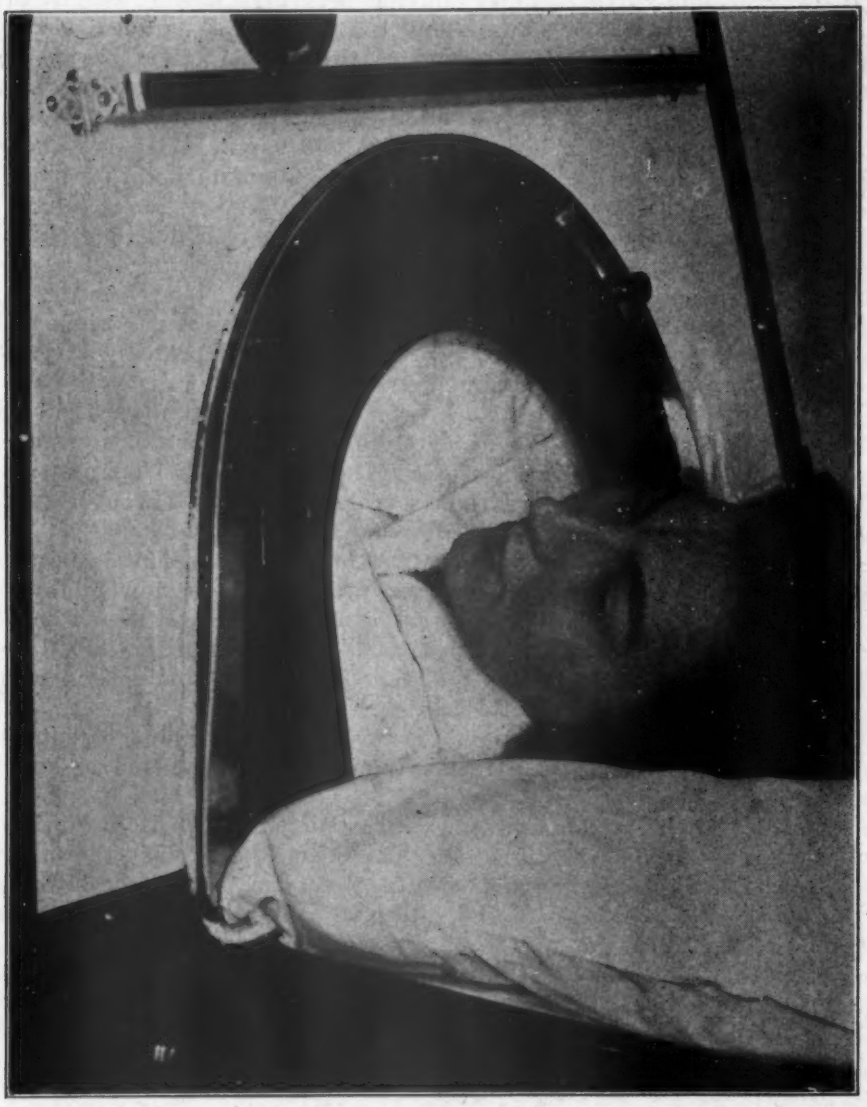

Fig. 1. — The bath towel, which has been folded lengthwise and placed across the pillow, is now folded around the patient's neck, muffler style, with the ends over the chest.

mometer for accuracy after it has been placed in the "on" position. These instructions are supplied with the equipment. There is a five minute lag period required for the cabinet thermometer and the rectal indicating thermometer to register accurately; therefore, the timepiece to be used throughout treatment should be set to five minutes before the even quarter hour, and the first reading recorded on the even quarter hour.[3]

The rectal indicating thermometers are standardized at weekly intervals, or more often if desired, in a constant temperature mercury bath containing a Bureau of Standards mercury thermometer. The importance of this procedure cannot be overemphasized, since accuracy of temperature recordings at the 106.0 F. rectal level is mandatory for the safety of the patient.

The patient is instructed to lie on his back and to assume a comfortable position. The bath towel, which has been folded lengthwise and placed across the pillows, is then folded around his neck, muffler style, with the ends over the chest (fig. 1). The patient holds this in place while the hood of the cabinet is lowered. A second towel is then folded end to end and used to cover the pillow. Two more towels are placed over the metal bar at the head of the cabinet, with the center folds overlapping diagonally. The ends are tucked under the neck piece of the cabinet. Large safety pins are used to secure the towels in this position (figs. 2 and 3). The

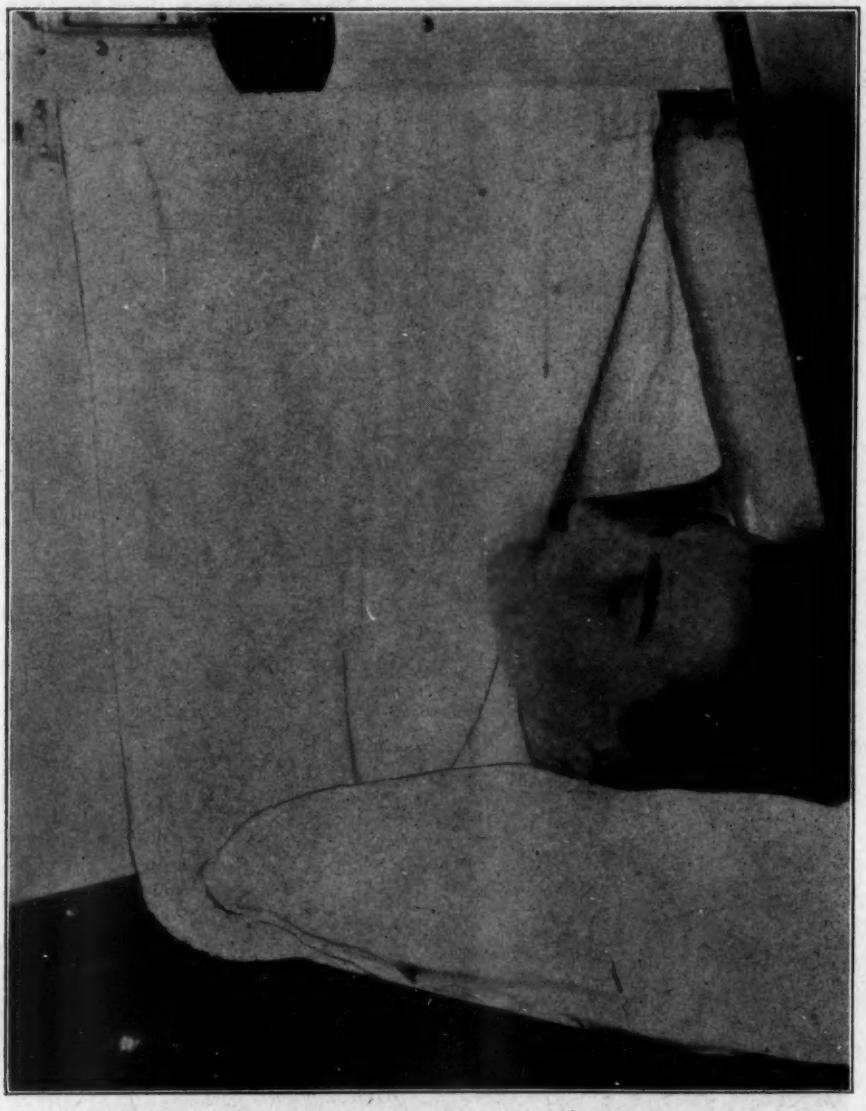

Fig. 2. — The right towel is over the metal bar, with the center fold overlapping diagonally.

pillows are adjusted under the patient's head and neck in such a manner that no warm air may escape from the cabinet (fig. 4).

While the cabinet thermometer and the rectal thermometer are adjusting, intranasal oxygen therapy[8] is instituted. A latex catheter (14 gage,

8. Craig, R. M.; Schwemlein, G. X., and Kendell, H. W.: Artificial Fever-Chemotherapy: II. Arterial Oxygen Saturation, Arch. Phys. Med. 25:665 (Nov.) 1944.

French) is placed through one of the nasal passages. This is accomplished by measuring on the patient the distance between the tragus of the ear and the tip of the nose and inserting this length of catheter into the oropharyngeal junction. The catheter is attached to the bridge of the nose and the forehead with adhesive tape (fig. 4). Humidified oxygen is then supplied at a 5 to 8 liters per minute flow. The oxygen tanks are centrally located outside the fever units and the oxygen piped into each unit. This eliminates the necessity of changing the tanks in the units during treatment.

Throughout the induction period, the patient's body temperature[9] and pulse rate and the air temperature of the cabinet[10] are determined and record-

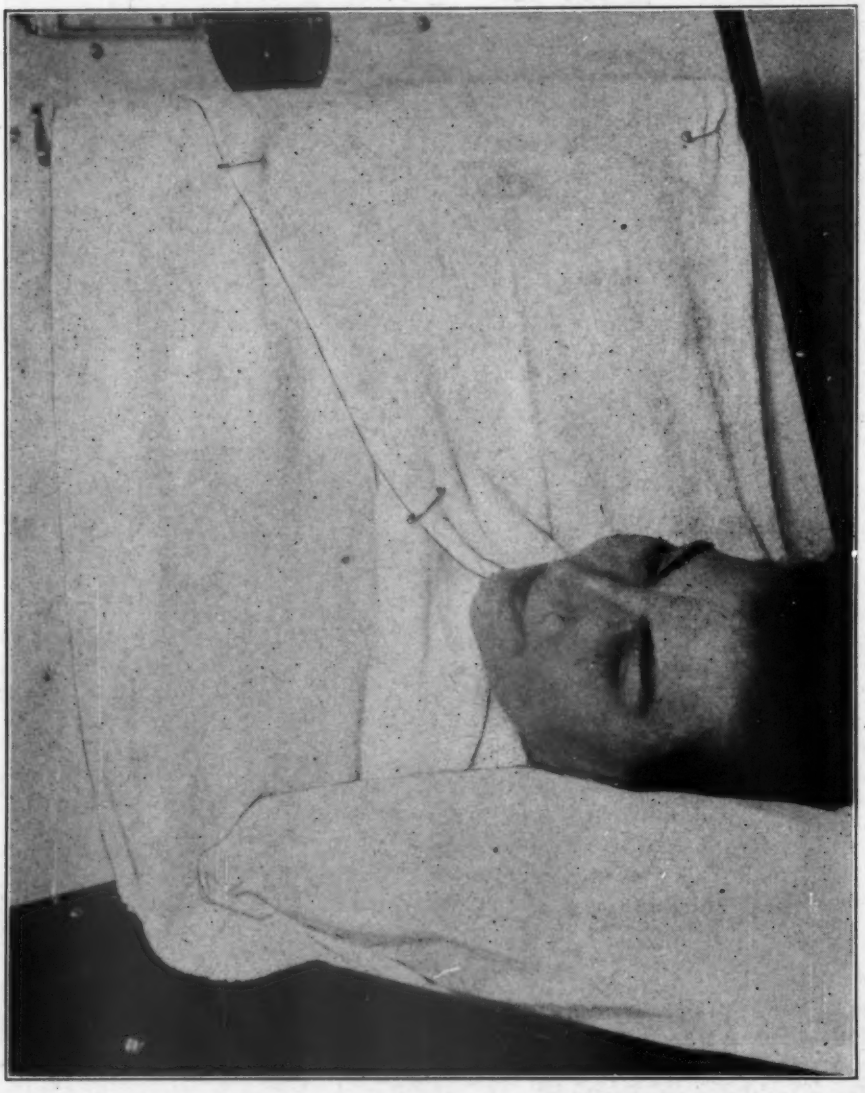

Fig. 3. — The right and left towels are over the metal bar and pinned in position.

ed every fifteen minutes.[2] The patient begins to perspire profusely after ten or fifteen minutes and therefore is encouraged to drink cool 0.3 per cent sodium chloride solution to replace the loss of water and sodium chloride.

9. Hereafter, the patient's body temperature will be referred to as body temperature.
10. Hereafter, the air temperature of the cabinet will be referred to as air temperature.

Approximately 100 to 200 cc. are given every fifteen minutes by means of a glass drinking tube (fig. 4), in divided amounts if desirable.

The air temperature should never exceed 115.0 F. after the patient is placed in the cabinet and should be gradually reduced as the body temperature increases. If the initial air temperature reading exceeds 115.0 F., the proper method for reducing this temperature is to turn the main switch of the cabinet to "off" position until the air temperature decreases to the

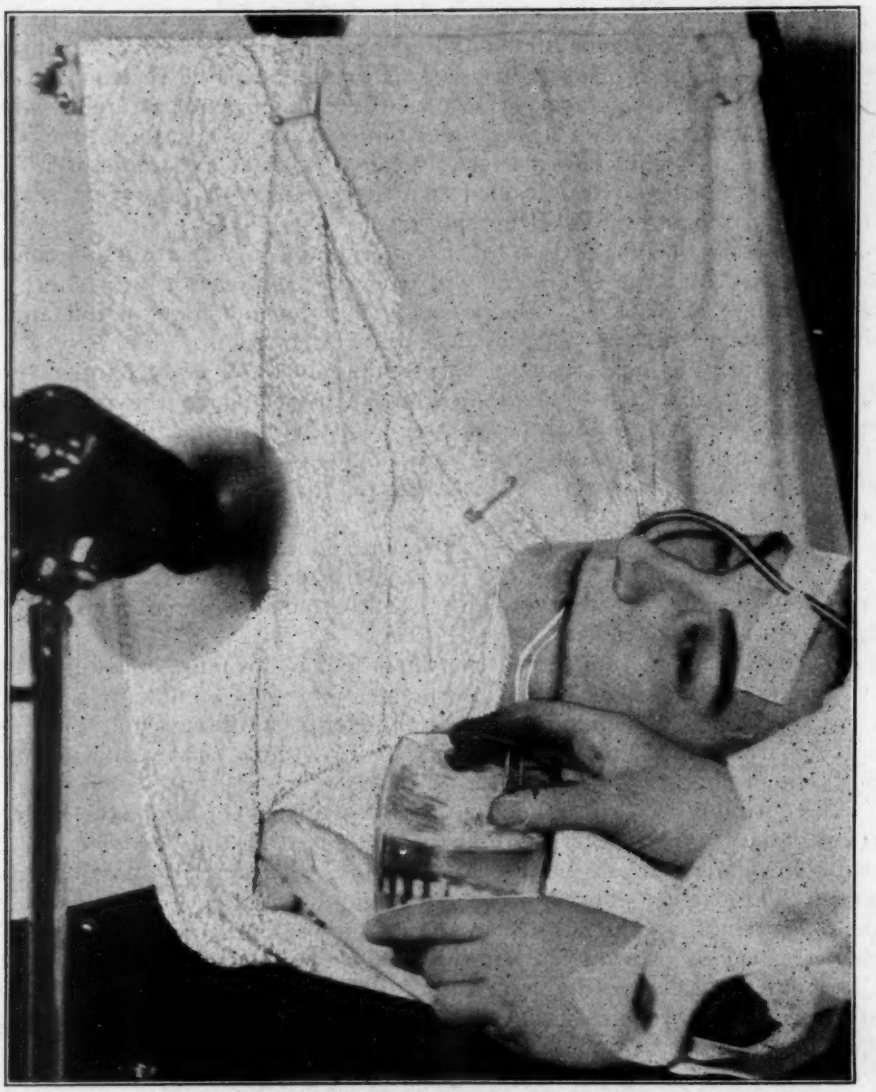

Fig. 4. — The four towels are in position. The patient has a nasal oxygen catheter in the right nostril and is drinking 0.3 per cent sodium chloride solution through a glass tube.

desired level. The cabinet switch is then again turned to "on" position, and the air temperature regulated by means of the temperature control element.

The nurse-technician will develop a method of correlating the reduction of air temperature as the body temperature becomes elevated. The technic cannot be empirically stated, since variations in length of the period are due to climatic conditions of the fever unit, cabinet air temperature during

the induction period, humidity of the cabinet air, size of the patient and physiologic pattern of the patient.

It is desirable that the cabinet doors remain closed as much as possible during the induction period so that there is no sudden reduction in the air temperature. Maximum percentage humidity must also be maintained to prevent evaporation of the patient's perspiration, which would cool the patient and prolong the induction period.

Patients tend to become restless at 102 to 106 F. rectal level. Pantopon, 1/6 grain, is given hypodermically when the patient reaches the 100.0 F. rectal level, so that the maximum therapeutic effect may be had during this period of discomfort. The patient is comfortable after he reaches the 106.0 F. rectal level (maintenance period), as the cabinet temperature usually is lower than 106.0 F. This low cabinet temperature is ascribed to effective insulation of the cabinet, preventing the loss of heat and moisture. The fever unit should be air conditioned (whenever possible) to prevent seasonal variations in temperature and humidity.

The persistent application of psychotherapy by the nurse-technician and assurance that the treatment will be more comfortable in a short time will minimize the patient's discomfort during the induction period and encourage constant cooperation on the part of the patient.

A single head fan is usually turned on when the body temperature is within 1 to 2 degrees of the desired level, according to the rate of body temperature elevation and the cooperation of the patient. This fan may be turned on at any time during the induction period at the discretion of the nurse-technician. Care should be taken not to direct it toward the neck opening of the cabinet.

The pulse rate as determined at the temporal artery usually increases at the rate of 6 beats per degree rise of body temperature. A few patients may show variations, however, although the pulse volume registers little change.

During the induction period the nurse-technician must constantly be on the alert for complications[11] and must investigate any complaint the patient may express. Signs or symptoms of impending cardiovascular or respiratory embarrassment must immediately be brought to the attention of the physician in charge.

A continuous urinary function is one evidence of adequate hydration of the patient during fever. He should be asked at the end of every hour during the induction and maintenance period, to urinate, if possible, unless asleep. The cabinet door must be opened and closed as quickly as possible when the urinal is being placed in the cabinet and removed. The male patient is asked to turn on his left side while urinating. The female patient is instructed to elevate her hips before the cabinet door is opened so that the bedpan may be quickly placed beneath her hips. Similar procedures are repeated when the bedpan is removed.

When the body temperature is within 1.0 degree (F.) of the desired level, the patient's rectal temperature is determined with a clinical thermometer in order to verify the accuracy of the rectal indicating thermometer. The contemplated procedure is explained to the patient and the rectal indicating thermometer turned to "off" position. The patient is asked to turn on his right side, the left cabinet door is opened, and the bulb of the indicating thermometer is removed and placed on the mattress near the patient. The bulb of an accurate clinical thermometer which has been lubricated is placed in the anus and remains for two minutes with the cabinet door closed.

11. Craig, R. M.; Schwemlein, G. X., and Kendell, H. W.: Artificial Fever-Chemotherapy; Complications and Their Treatment, to be published.

If the thermometer readings agree within reasonable limits, the bulb of the rectal indicating thermometer is lubricated and reinserted. The indicating thermometer is rebalanced and five minutes is allowed for the indicator to stabilize.

Recording of Necessary Data During the Induction Period.

Time	Patient's Rectal Temperature	Pulse	Blood Pressure	Urine	Oral Fluids	Cabinet Temperature	Cabinet Control Element	Nasal Oxygen
					0.3% NaCl cc.			
			104(L)/ 75-70					
8:15	99.5	94			200	115	70-65	6
8:30	101.3	112			200	114	60-55	
8:45	103.0	108		50	200	112	50	
9:00	104.7	106			200	111	45	
9:15	105.8	102	132(L)/ 60-0		200	107	40	4

The induction period ends when the temperature reaches 105.8 F. rectal if the desired temperature level is 106.0 F. rectal, and the maintenance period[12] begins.

Summary

1. The immediate preparation of the fever cabinet and of the patient is described.

2. Technics for the induction of therapeutic fever are presented in detail.

12. Schwemlein, G. X.; Buroker, F. M., and Craig, R. M.: Artificial Fever-Chemotherapy: VI. Maintenance Period, to be published.

The following nurse-technicians collaborated in the development of the procedures described in this paper: A. J. Ryan, R. N.; B. L. Lloyd, R. N.; M. E. Schroeder, R. N.; A. H. Miller, R. N.; K. E. Wilson, R. N.; L. B. Linkenheil, R. N.; D. H. Tome, R. N.; V. Balog, R. N.; E. V. Burge, R. N., and M. L. Olson, R. N.

EDITOR'S NOTE: This is the fifth of a series of articles on artificial fever-chemotherapy to be published in the ARCHIVES. The first article in the series appeared in the October, 1944 issue, the second in the November, 1944 issue, the third in the January, 1945 issue and the fourth in the June, 1945 issue.

RESPONSIBILITY OF THE PHYSICAL THERAPIST TO THE COMMUNITY *

DON W. GUDAKUNST, M.D., DR. P.H.

Medical Director, The National Foundation for Infantile Paralysis

NEW YORK

The responsibility of all in work that has to do with ministering to the sick grows increasingly great. Each year that responsibility becomes not only greater, but more complex. In a primitive civilization the problems of the medicine man were simple indeed. His skills were few—his knowledge of disease and its causes almost nil. There was no need for change, or opportunity for improvement. The medicine man took credit where no credit had been earned and explained failure by placing the blame on an angry god. His was an easy mastery of the healing art.

Witchery, sorcery, chicanery and buffoonery were the stock in trade. Yet medicine persisted. The art became a profession, and now it is fast becoming a science. The practice of medicine persisted because of one fact. It was the wish of the people that there be some group of persons set apart from all others to whom the problems of individual health could be entrusted. With this trust went faith.

The faith factor was further increased during the Middle Ages. It was then that almost the whole problem was taken over by the priesthood. This was not new, for the medicine man of primitive people also was the religious leader. But the church of the Middle Ages had a more direct influence on the thoughts and behavior of the people.

Medicine of today is in a new era. It has lost some, but unfortunately not all, of the mysticism of its early days; it has retained an aura of separateness based on faith. To these things has been added science. But this is an addition—it is not yet an essential part of the everyday practice. Possibly it never can be, for possibly a too tremendous change in the entire structure and pattern of medical practice is called for to allow the scientific aspect to assume the dominant position in all medical practice.

These points are made because physical therapy and physical medicine are of the oldest order in all the art of the healing profession. That which applies to medicine in general must apply particularly well to its oldest modality. Those who are in physical medicine would do well to have a sound appreciation of the social problems of medicine as a whole. While much of the art of this field is older than recorded history, it is to be recognized that physical therapy is new as a profession. It is so new that not only does the public fail to understand it, but other branches of the healing art share in this lack of knowledge.

The problems presented on entrance to practice are not only those of medicine in general but in addition those that belong peculiarly to physical therapy. These present challenges that must be met.

There is the faith of the mass of the public in respect to all things medical. That faith extends to physical therapists and their work. But the public does not know about this work. It does not know nor understand the term "physical therapy." Many have never seen this strange creature called a physical therapist.

This is not all. By far the majority of physicians practicing today have never used the services of a skilled physical therapist. Most nurses have

* Read at the Graduation Exercises, Cleveland Clinic, June 15, 1945.

never shared the responsibility of care of a patient with one in this profession. Relatively few hospitals have had physical therapists on their staffs. Evidence of this lack of understanding could be multiplied almost indefinitely.

It is because of these things that the responsibilities are disproportionately great. Those entering this oldest branch of medicine must be prepared to share the grave duties of protection of all medicine in a changing world and must, in addition, be extraordinarily keen in respect to their individual responsibilities.

There are a few homely bits of advice I should like to give to you who are starting on this venture. First, when you take a job stick to it, do not yield too readily to the lures of distant places. Physical therapy cannot become an established part of community activities unless the physical therapist herself is stable and at least as permanent as nurses, doctors and dentists. Today, because of the shortage of adequately trained workers, any graduate from any approved school can gain employment in almost any place desired. The shifting, the wandering from place to place, may be entertaining, but it is not of benefit to the profession. This work is personal and intimate. The patient relationships are, therefore, personal and intimate and should, if the essential element of faith is to be preserved, be as permanent as possible. While it is possible to do so, the profession of physical therapy should not be followed as a means of seeing the world.

Another thought worthy of serious consideration has to do with physician relationship. You have been trained as an aide to the physician. Physical therapists, like many other professional groups, have acquired skills, abilities and even, at times, knowledge beyond those of the physician. The doctor orders physical therapy treatment; the physical therapist fills that order. The physician is asking that things be done for his patient which he himself cannot do. He cannot do them because of lack of time, or lack of specific skill, or for any number of other reasons. This places a grave responsibility on the physical therapist—a responsibility accompanied by a temptation to practice independently of the medical man. All arguments in favor of this are fallacious and short sighted. Avoid the temptation or else the profession is doomed to a role that meets those on the fringes of good medicine. Individuals may prosper for a time, but physical therapy as a profession will die.

Another responsibility to the community is that for continued graduate training. This is not going to be easy, but it is necessary. Physical therapy as taught and practiced today is a far cry from that of twenty-five years ago, from that, even, of ten years ago. The changes brought about during the past decade are as nothing compared with those that are possible during the next few years. Physical medicine has been empiric and has been based on limited clinical experience. But now it is becoming a science. Plan your work so that you can continue your education. The possibilities of physical medicine are largely latent and unexplored. Research in the field is new. The National Foundation for Infantile Paralysis takes great pride in its contribution in this field. It has established and financed research centers, combining research in physiology with clinical practice in physical therapy at three great universities. These research programs are new. They are just beginning to exert their influence in practice. No matter how busy you become you must plan to continue your training and education.

One more responsibility has to do with teaching. Each of you is a teacher. You must be—your success as a physical therapist depends on your ability to teach individual patients how to do things. This talent must be put to additional uses. Teach all you can to members of other branches of medicine. Your physician wants to know what you know, not so that

he can apply the work himself, but so that he can use the skills of the trained worker to greater advantage.

The nurse must be taught what you know, not so that she can compete with you and serve in your place, but so that the programs of physical therapy and nursing can be integrated into a unified service to those needing care. The hospital superintendent, the x-ray technician and the laboratory worker are but a few of those with whom the physical therapist works who are in need of instruction. But even this is not enough. These people cannot help but learn something about physical therapy by working in the same hospital with physical therapists. Patients and patients' families must be taught to look on physical therapy as a real profession, based on scientific knowledge. Only in this way can the danger of commercial ventures, with their mislabeled physical therapy services, be overcome. These are evils that cannot be touched by legislation alone. They call for education.

It would be well for the forces of physical therapy to be linked closely in each community with the forces of health education. Both are new as professions; both are of inestimable potential value to medicine and the health of the public. Such liaison will in some places be a result of official action, but more frequently it will be brought about by voluntary action on the part of the physical therapist herself. Seek out those in health education; usually they are to be found working in health departments or school systems. Tell them what physical therapy is, how it can be used, where secured, how it is related to medical care and the practice of medicine. This is not for the furtherance of any selfish ends but is sincerely concerned with community health and your profession's responsibility to the community. It is protection against quackery; it is the weapon with which to fight the unaccredited school and its unlicensed graduate. It is a protection against malpractice arising from within your own ranks.

I have presented but part of the picture that concerns you as individuals. There is more—much more—but there is another aspect that concerns health agencies such as The National Foundation for Infantile Paralysis. Our obligations are equally great and our responsibilities to the community are equally grave. We are concerned with improvement of medical practice in respect to a single disease—infantile paralysis. Today, with our present knowledge, almost the only treatment of value, after the acute infectious episode has passed, is physical therapy. True there is orthopedic surgery, but this is the last resort when physical therapy has failed, and even then orthopedic surgery must use physical therapy. In 1944, if every physical therapist registered in this country and remaining in civilian practice had been assigned to care of infantile paralysis patients, we would have needed every one of them to minister to the newly reported cases. Thousands of those patients must continue to have intensive physical therapy for years to come. No one knows how the 1945 problem is to be met. There will be epidemics and no physical therapists to treat the patients. It is for this reason that the National Foundation recently announced the appropriation of $1,227,000 for scholarships for physical therapists and for aid to physical therapy schools and their programs of instruction. This will not meet the needs—it will furnish less than an additional 1,000 skilled professional workers—while the immediate demands are for at least 5,000 more than now exist. Only by increasing the number of persons in this field can the infantile paralysis patient be assured the maximum chance for recovery. Your problems are immediately and directly the problems of The National Foundation for Infantile Paralysis, and that organization is willing to render help in every manner possible. The challenge is great but the rewards to the real worker will be even greater.

ARCHIVES of PHYSICAL MEDICINE
OFFICIAL PUBLICATION AMERICAN CONGRESS OF PHYSICAL MEDICINE

EDITORIALS

SPA THERAPY AS PART OF THE AMERICAN HEALTH SYSTEM

Much has been written in recent years about the insufficient appreciation of American Spas by the medical profession and the public and recommendations have been made for the improvement of the status of American Spas.[1-2] In connection with the War some of the Spas have been taken over by the armed services and the Veterans Administration to serve in the military rehabilitation program. With the advent of Peace postwar national reconstruction offers a unique opportunity to American Spas to organize for a new and high standard of services. The American hospital system, admired the world over, insures skilled and dependable care alike to millions of rich and poor. There are great possibilities for well organized and well directed health resorts to help large numbers of sufferers from chronic illness and to recondition those who are simply worn out and tired. The end of the war makes available many medical men with good basic knowledge in general medicine, physical therapy and rehabilitation, who make good material for special training as spa physicians. There will be likewise many good physical therapy technicians, men and women, looking for opportunities to continue their work in rehabilitation and reconditioning. In an article published under the auspices of the Committee on Health Resorts of the American Medical Asosciation,[3] it was stated that in order that American Spas may succeed in rendering a high standard of service in the years of national health reconstruction, besides the fulfillment of the recommendations towards a high grade medical service, a long range nationwide program under spirited leadership is desirable, effecting a change in the present attitude of the medical profession and the public towards the Spas and enlisting the cooperation of the various communities and authorities. The local community of every health resort should be made aware of the fact, that when properly conducted, a health resort constitutes an important asset to the community, the same as a hospital. A Federation of American Spas should have been formed a long time ago for cooperation of Spas to safeguard ethical standards in operation and publicity. There would seem to be also a role for another national organization, an independent Council or foundation which may advise and assist Spas to become more useful regionally or nationally, help them in securing medical and technical staff of acceptable standards, and assist in research and also in education of the public and the medical profession.

Rheumatic conditions form the largest percentage of chronic illness which can be benefited by Spa therapy. An earlier article in the ARCHIVES[4] pointed out the advantages of Spa therapy in these conditions and now series of articles beginning with this issue[5] will enumerate the facilities already in operation in a number of representative Spas. In striving towards the goal of a high standard of service American Spas and their medical staff might just as well begin by comparing notes as to the diagnostic and thera-

1. Report of the Committee on Spas and Health Resorts, American Congress of Physical Therapy, Arch. Phys. Therapy 20:42 (Jan.) 1939.
2. Report of the Baruch Committee on Physical Medicine, April, 1944, p. 68-71.
3. Kovács, Richard: The Problem of the American Spas, J. A. M. A. 127:977 (Apr. 14) 1945.
4. Scully, Francis J.: Spa Therapy in Arthritis and Rheumatic Disorders, Arch. Phys Therapy 26: 233 (May) 1945.
5. Kovács, Richard: Spa Treatment of Rheumatic Disorders in the United States, Arch. Phys. Therapy 26:567 (Sept.) 1945.

peutic care of the rheumatic group of patients, enlist the active interest of national medical and health organizations by asking suggestions as to the most effective co-operation in a medical and economic way towards combating the physical and economic loss caused by chronic rheumatism. There is undoubtedly much room for further improvement and expansion of the health restoring routine on many of our American resorts.

PHYSICAL MEDICINE AT THE END OF WORLD WAR II

The joyful news of the sudden ending of the Second World War found the number of physical therapy departments in various service hospitals and rehabilitation centers at an all time high and the role of physical therapy as the keystone of rehabilitation well established. It also finds the plans for a sound, permanent development of Physical Medicine recommended by the Baruch Committee on Physical Medicine and actual provision for combined research and teaching in medical schools, as well as a large scale subsidy by the National Foundation for Infantile Paralysis for adequate training of technicians. Reconversion to peacetime industrial production will soon bring relief to civilian physicians by the renewal of supply of physical therapeutic apparatus and should also bring out new types and designs of apparatus. All this points to considerable further expansion of the general utilization of Physical Medicine.

Alongside this bright picture, however, there are quite a few problems awaiting solution in the field of Physical Medicine. In order that it may attract medical men of ability and vigor, this field must offer recognition and means of livelihood comparable to other fields of medicine. While the necessity of well trained specialists in physical therapy, able to carry on research, instruction and clinical directive has been fully recognized, no provisions have been made as yet to grant them recognition as such under a national board. This is a situation which will offer increased handicaps and many awkward situations in filling institutional positions. On the economic side, whilst the employment of a few basic modalities by the general practitioner requires but little space and assistance, the keeping up of a physical therapy specialist's office is quite an expense. Starting in practice as a full fledged specialist in physical medicine faces handicaps and the establishment of a private practice in physical therapy by medical men returning from the War will be a serious problem. There exists a demand for a few highly trained and experienced men as teachers and heads of departments but this does not solve the situation for the average man. Many of these as well as the technicians partaking in emergency courses during the War, will be in need of additional training and experience to fit them for civilian practice. The quandry of physicians may be partly solved by such part-time institutional or industrial positions, which offer an acceptable salary or percentage of income and the promise of some advancement. It would appear, however, undesirable indeed, if the practice of Physical Medicine were to be institutionalized altogether.

We may hope that by cooperation of all factors concerned, with time and patience, these difficulties can be gradually resolved. There will be work for many years to come for physicians and technicians trained in physical therapy in rehabilitation centers and Veterans' hospitals. The return or new entry of many enthusiastic young minds into the field of physical medicine should bring forth many new developments in laboratory study and in clinical application, as already evidenced by some of the recent articles published in the ARCHIVES. We also look forward to the stimulus of the resumption of our national and regional medical meetings and to that of a new spirit of international cooperation.

MEDICAL NEWS

Rose Appointed Consultant in Physical Therapy to Surgeon General of the Army

According to a recent directive from the Office of the Surgeon General, Major Donald L. Rose, M.C., Director of Physical Therapy, Walter Reed General Hospital, Washington, D. C., in addition to his duties at that hospital, is assigned as Consultant in Physical Therapy to the Surgeon General, effective August 14, 1945.

Assignment of Medical Officers to Veterans Administration

June 20, 1945.

Dr. Morris Fishbein,
Editor, The Journal,
Chicago.

Relative your telegram 14 June, in future Medical Corps officers will not be assigned to Veterans Administration unless they were previously employed by that agency or they specifically request such assignment.

KIRK,
Office of the Surgeon General
Washington, D. C.

—J. A. M. A. 128:669 (June 30) 1945.

Charles F. Kettering Gives Commencement Address

On June 21, Temple University School of Medicine held its commencement exercises. Charles F. Kettering, D.Sc., vice-president and head of the research department of General Motors delivered the commencement address.

Mayo Clinic Completes Its Emergency Program in Physical Medicine

In January, 1942, the Mayo Clinic Section on Physical Medicine inaugurated an emergency program for providing personnel, both medical and technical, to meet the needs of war. In addition to the establishment of emergency courses for training of physical therapists, the Mayo Clinic Section on Physical Medicine also developed emergency training courses for medical officers of the Army, Navy and Veterans Administration. On July 1, 1945, the emergency training program for medical officers was discontinued and when its present class of physical therapists completes training on July 1, 1946, the emergency program for training of physical therapists will also be discontinued.

During the period of the emergency, the Section on Physical Medicine at the Mayo Clinic has trained 136 medical officers and 436 physical therapists. This is a grand total of 572 persons who have been trained to meet the demands for qualified personnel, both medical and technical, for physical rehabilitation of the casualties of war.

Baruch Center of Physical Medicine

The Baruch Center of Physical Medicine of the Medical College of Virginia participated in the seven-day program of the Third National YMCA Health Service Clinic, which met in Richmond, August 5-11, 1945. Members of the staff gave lectures in applied anatomy, applied physiology and physics. A Symposium on Physical Medicine was held at the Medical College of Virginia Hospital on the afternoon of August 8. The object of the Symposium was to point up through demonstration and discussion the relation of the YMCA health service program to the practice of physical and occupational therapy. One day was spent at the McGuire General Hospital during which the physical therapy section, amputation section and brace shop were visited. The Army film "Swinging Into Step" had been shown at the Medical College on the previous day. The adapted sports program for Class III (ambulatory) patients concluded the McGuire General Hospital demonstration.

Dr. Josephine J. Buchanan has joined the staff of the Baruch Center of Physical Medicine, Medical College of Virginia. She carries the title of Assistant Professor of Physical Medicine and will serve as the Technical Director of the physical therapy technician training school to be administered jointly by the Richmond Professional Institute of the College of William and Mary, and the Medical College of Virginia. Miss Sue Hurt, Director of Occupational Therapy at the Richmond Professional Institute, spent the month of July at the Workmen's Compensation Board Clinic, under a grant from the National Foundation for Infantile Paralysis. The exchange fellow, Miss Mary Elizabeth Clark, Supervisor of Occupational Therapy at the Workmen's Compensation Board Clinic, spent the month of July at the Medical College of Virginia Hospital, where she assisted in the planning and organization of an orthopedic occupational therapy workshop to be instituted in the near future.

Ashford General Hospital Holds Graduation for Physical Therapists

The following program was presented as part of the graduation exercises for the training course in physical therapy, held Aug. 9, at Ashford General Hospital, W. Va.:

The Pilgrim Grand March. By M. E. Lake,

453rd ASF Band, WOJG, Freeman L. Russell, Band Director; Invocation: Post Chaplain Robert H. Clarke, Lt. Col., Chc.; Address, Colonel C. M. Beck, Presentation of Certificates; Address: Major Emma E. Vogel, Capping Ceremony, Student Physical Therapists; Benediction: Chaplain Clement E. Kane, 1st Lt. Chc.; Star Spangled Banner, 453rd ASF Band.

Carl Levenson, Major, MC, is director of the Physical Medicine Section. Agnes P. Snyder, Captain PT, is the Chief Physical Therapist.

Dr. Hollender Heads Refresher Course

The University of Illinois College of Medicine announces its sixth semi-annual refresher course in laryngology, rhinology and otology, September 24-29, 1945. Write to Dr. A. R. Hollender, Chairman, Refresher Course Committee, Department of Otolaryngology, University of Illinois College of Medicine, 1853 West Polk Street, Chicago 12.

New Publications

Attention is called to the following publications which may be obtained on request from the American Society for the Hard of Hearing, 1537 35th Street, N. W., Washington 7, D. C.:

"Psychological Aspects of Deafness," Foster Kennedy, M. D., 10c; "What the Army Is Doing," L. E. Morrissett, Major, U. S. A., 10c; "Digest of State Laws Affecting Deaf and Hard of Hearing, With Supplementary Notes, 1943," 25c; "Injuries to Hearing in Industry," Warren H. Gardner, Ph.D., 10c.

"Reemployment of Ex-Service Men and Women" has been discussed in the following series of booklets issued by the Associated Industries of New York State, Inc., 361 Delaware Avenue, Buffalo 2, New York:

"Obligations of Employer"; "Job Analysis for Sound Placement"; "Medical Program"; "Placement and Followup"; "Training Methods," and "The Soldiers Say Don't Do It!"

The programs suggested are based on experiences and practices of companies having well organized personnel functions and upon official interpretations of the law itself.

Complimentary copies of "Epilepsy—The Ghost Is Out of the Closet," by Herbert Yahraes are available on request from the Association to Control Epilepsy, Inc., 22 East 67th Street, New York 21, N. Y.

The Women's Bureau of the United States Department of Labor has published three more bulletins in the series planned to discuss the outlook for women in occupations in the medical field: "Medical Record Librarians" is listed as bulletin 203, number 6; "Practical Nurses and Hospital Attendants," bulletin 203, number 5, and "Medical Laboratory Technicians," bulletin 203, number 4. These bulletins are for sale by the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C.

Outdoors Indoors. Prepared for the National Recreation Association by Reynold E. Carlson, Director, Nature Recreation Service, with drawings by E. H. Peterson. Paper, price 75 cents. Recreation While on the Mend, prepared by the same association cost $1.25. Either pamphlet may be obtained by writing the association at 315 Fourth Avenue, New York 10.

Report on Harrogate Visit. Harrogate Corporation Wells and Baths Department. Prepared by Professor L. S. P. Davidson, Professor of Medicine, Edinburgh University. It is printed by Jowett & Sowrey, Albion St., Leeds 1.

British Health Services Today may be obtained by writing Information Division of the British Information Services with addresses in the principal cities.

Medical School News

Dr. George W. Wakerlin, professor of physiology and head of the department, University of Illinois College of Medicine, has been appointed to serve also as assistant dean in charge of teaching and research at the Rush-Presbyterian Hospital, Division of the University of Illinois College of Medicine. Dr. Warren H. Cole, head of the department of surgery, has been appointed associate dean.

The Lester N. Hofheimer estate has granted $35,000.00 to Columbia University College of Physicians and Surgeons to finance the first year's expenses of the newly created Psychoanalytic and Psychosomatic Clinic for Training and Research.

Lieut. Col. Hardy A. Kemp, M.C., Secretary of the Army Medical School, Washington, D. C., has been appointed dean of the Wayne University College of Medicine, Detroit. Colonel Kemp graduated at St. Louis School of Medicine in 1926 and prior to his entrance into the service was dean of the Ohio State University College of Medicine, Columbus, Ohio. Dr. Raymond Hussey, recently discharged from the Army, has assumed his duties as dean of the new School of Occupational Health, a part of the Medical Science Center.

On July 1 the Ohio State University College of Medicine, Columbus, launched a plan for postgraduate training designed primarily for returning veterans and other physicians who may wish to participate. Those who take the course will be required to spend full time in the university hospital or affiliated institutions of the medical school for a period of not less than two weeks nor longer than three months and will be under the immediate supervision of one of the members of the faculty whom they shall select and who shall serve as a counselor. Additional information may be obtained from Dr. Bruce K. Wiseman, Kinsman Hall, Ohio State University, Columbus 10.

Dr. Charles F. McKhann, assistant to the president in charge of research, Parke, Davis & Com-

pany, Detroit, has been named professor of pediatrics at Western Reserve University School of Medicine and director of pediatrics at University Hospitals, Cleveland. He succeeds Dr Henry J. Gerstenberger as professor of pediatrics at Western Reserve and director of Babies and Children's and Rainbow hospitals.

School for Crippled Children Named for Harry Mock

The Harry Mock School for Crippled Children was recently opened in Muncie under the sponsorship of the Delaware County Crippled Children's Association in cooperation with the city. The school was named for Dr. Harry T. Mock, Chicago, who was born in Muncie, where he later went to school. Dr. Mock, who served as a colonel in the medical corps during World War I, in charge of rehabilitation of disabled soldiers, wrote a "Creed of the Handicapped," which has been adopted as the motto for the school named in his honor. It reads:

Once more to be useful; to see the pity in the eyes of my friends replaced by commendations; to work, produce, provide—seeking no favors and given none—a man among men in spite of my physical handicap.

Fewer Infantile Paralysis Cases Expected in 1945

Although the U. S. Public Health Service has warned of a seasonal rise in infantile paralysis, it also reports evidence that the number of infantile paralysis cases this year may be much fewer than the 19,053 recorded during 1944, which was the second highest number on record; 27,363 cases occurred in 1916.

Standardization of Artificial Limbs

At the request of The Surgeon General, the Subcommittee on Orthopedic Surgery of the National Research Council called a conference in Chicago attended by representatives of the National Bureau of Standards, Army, Navy, Veterans Administration, scientists and artificial limb manufacturers to consider the problem of standardization and improvement of artificial limbs.

As a result of this conference, the National Research Council has made definite p'ans for a committee for research and development in limbs. The various Army amputation centers will cooperate with this committee for the clinical evaluation of appliances that may be subjected to trial. A complete chart of stock sizes has been prepared which will enable the Army amputation centers to fit almost any size desired. Exceptional cases may require special order. A complete assortment of the parts that go into an artificial leg will be made available so that each center will be able to continue the policy of making custom-built legs for each amputation case.

An improved artificial leg providing the best innovations and improvements of legs now in use will soon be available for use by the Army. A cast aluminum knee joint for above-the-knee legs, consisting of skin-top and a knee block, and a cast-aluminum ankle assembly, consisting of shin and foot sections, have been adopted. Both are to be produced in quantity with the necessary modifications for bonding to metal, plastic, or fiber. Specifications for joints will provide for the best material and workmanship and will compare to the highest industrial standards. Training courses have been established for orthopedic mechanics from each center to receive training in metal and plastic limbs.

Occupational Therapy Expansion

Twenty-nine emergency course apprentices from Mills College, California, have been assigned to hospitals for clinical training in occupational therapy. Seventy students have been assigned to the War Emergency Course, Milwaukee-Downer College, Milwaukee, Wisconsin, and seventy-five enlisted women have been assigned to courses for occupational therapy assistants at Halloran General Hospital.

H. J. Rubenstein

The Congress offices have received the announcement of the passing of one of its members, Dr. H. J. Rubenstein of New York. Dr. Rubenstein was also a member of the New York Society of Physical Medicine.

H. Louis Dietz

It is with regret that we announce the death of one of our members, Dr. H. Louis Dietz of Oakland, California.

Correction

The following which appeared on page 515 of the August 1945 issue should have read as follows:

If a cadaver is stood upright on its feet, the knees flex and the body crumples down on the floor. If the knees are held rigid by the application of splints to hold the knees extended, and if the cadaver is steadied in the upright position by the pelvis, the trunk falls forward. . . . If the knees are prevented from flexing by splints, the erect position can be maintained without crutches only if the gluteus maximus muscles are strong enough to hold the trunk from falling forward, that is, if they can hold the trunk extended on the legs. The two muscles most necessary to maintain the erect position are the quadriceps extensor femoris and the gluteus maximus.

BOOK REVIEWS

FUNCTIONAL DISORDERS OF THE FOOT. By *Frank D. Dickson,* M.D., F.A.C.S., Associate Professor of Clinical Surgery, Medical School, University of Kansas; Orthopedic Surgeon, St. Luke's, Kansas City General, and Wheatley Hospitals, Kansas City, Missouri; Providence Hospital, Kansas City, Kansas, and *Rex L. Diveley,* M.D., F.A.C.S., Colonel, Medical Corps, Army of the United States; Orthopedic Consultant, European theater of operations; Orthopedic Surgeon, St. Luke's, Kansas City General, Research and Wheatley Hospitals, Kansas City, Missouri; Providence Hospitals, Kansas City, Kansas. Cloth. Pp. 352, with 202 illustrations. Price, $5.00. Second edition. Philadelphia: J. B. Lippincott Company, 1944.

Disabling conditions of the feet are so common and of so much importance, particularly in these times of man-power shortage, that a new edition of this popular book is indicated. In this second edition the most important problems in relation to functional disorders in military service and in industry are presented in two new chapters which add greatly to the value of the book.

The subject of functional foot disorders is covered quite completely, beginning with chapters on evolution, anatomy and physiology. Foot imbalance in childhood, adolescence and in the adult are discussed separately and methods of diagnosis and treatment are adequately described. There are also separate chapters on disorders of the hallux, affections of nails, skin, tarsal, metatarsal bones and the heel. The standard corrective operations are described with the aid of illustrative diagrams and detailed instructions are given as to proper shoes, supports, exercises and the use of physical therapeutic measures. Although the chapter on constitutional disease affecting the foot is rewritten it might be improved by more consideration of arthritic changes, disorders due to neurological disease and the prevention of foot symptoms secondary to prolonged immobilization.

This book is clearly and concisely written, adequately illustrated, eminently of practical value and recommended particularly to general practitioners now called on to treat the increasingly prevalent foot disorders.

ELIMINATION DIETS AND THE PATIENT'S ALLERGIES: A HANDBOOK OF ALLERGY. By *Albert H. Rowe,* M.D., Lecturer in Medicine, University of California Medical School, San Francisco, California; Consultant in Allergic Diseases, Alameda County Hospital, Oakland, California. Second Edition. Pp. 256. Price, $3.50. Philadelphia: Lea & Febiger, 1944.

At first glance the title of this book restricts the contents to a consideration of elimination diet in allergy; however, this is misleading for the author as is indicated in the subtitle has written an excellent general handbook on allergy. The approach is practical. The subject matter deals with such diversified aspects of allergy as allergic dermatosis, gastrointestinal allergy, allergic arthropathy and cardiovascular allergy. In addition considerable space is given to the common causes of allergy and the various allergens which may come in contact with the body tissues through inhalation, ingestion, contact on the skin or absorption from infectious processes.

In discussing food allergy the author emphasizes the advantage of elimination diets and the advantage of routine elimination diets over the indirect and fallible procedure of skin testing. As the originator of elimination diets the author gives an authoritative discussion of them and appends detailed menus for use under various circumstances.

Much highly useful information also is given relative to the taking of histories on allergic conditions, analysis of ingredients and allergens in all manner of food and household materials, histamine therapy, vitamins as related to allergy and directions for the use of pollen therapy. The material in the appendix alone is most worth while to any one who is interested in the treatment of allergic conditions.

AN INTRODUCTION TO MEDICAL SCIENCE. By *William Boyd,* M.D., M.R.C.P. (Edin.), F.R.C.P. (Lond.), Dipl. Psych. F.R.S. (Canada). Professor of Pathology and Bacteriology in the University of Toronto, Toronto, Canada. Pp. 366, with 126 illustrations. Cloth. Price, $3.50. Third Edition. Philadelphia: Lea & Febiger, 1945.

The book in its previous editions has already obtained an enviable position as a popular and valuable text for nurses and physical and occupational therapists in their training courses. This new edition, has been thoroughly revised in each chapter, but its form and style is essentially the same. The increasingly complicated study of the abnormalities of disease is again presented in a language understandable by the neophyte in the study of the medical sciences. In this text particularly and also in the other books by this author, the uniquely clear and easily understandable style of presentation has lead to a deserved popularity. The information as given is sufficiently authoritative because of the reputation of the author to make the omission of a bibliography of no importance.

The most significant addition to this edition is the inclusion of a new chapter on the principles of treatment. In this is described the use of general measures such as rest and diet, drugs, including penicillin and biological agents and a

brief outline of "physiotherapy" composed of paragraphs on massage, heat, electrotherapy, radiology, roentgenotherapy and also psychotherapy. Although this is a welcome addition, the explanation of the effects and description of sources of these physical agents is so brief that in the case of electrotherapy it is of little value.

This book is highly recommended as a text for elementary students of medicine such as nurses, physical therapists and occupational therapists.

INTRODUCTION TO PHYSIOLOGICAL AND PATHOLOGICAL CHEMISTRY WITH LABORATORY EXPERIMENTS. By *L. Earle Arnow,* Ph.G., B.S., Ph.D., M.B., M.D., Director of Biochemical Research, Medical Research Division, Sharp and Dohme, Inc., Glenolden, Pa.; Professor of Chemistry, Bryn Mawr College Summer School of Nursing, Bryn Mawr, Pennsylvania—1941-1943. Formerly Assistant Professor of Physiological Chemistry, University of Minnesota Medical School, and Lecturer in Physological Chemistry to students enrolled in the University of Minnesota School of Nursing, Minneapolis, Minn. With an introduction by *Katharine G. Densford,* B.A., M.A., R.N.; Director of the School of Nursing and Professor of Nursing, University of Minnesota, Minneapolis. Second Edition. Cloth. Price, $3.75. Pp. 574, with 144 illustrations and 31 tables. St. Louis: C. V. Mosby Co., 1944.

In the first edition of this excellent text book the author states, "A text book of this nature should be written for students, not for instructors." The writer has held rigidly to this praiseworthy goal. The book was revised for the second edition in 1943 and reprinted in 1944 showing how well it has been received. Its clarity, simplicity and logical presentation of subject matter make it an unusual book. It is divided into three parts. Part I is an introduction to chemistry giving only that material necessary for the understanding of the subject matter in part II which discusses physiologic and pathologic chemistry. Part III is devoted to an introduction to laboratory work and has been presented as thoroughly and simply as the remainder of the text. Experiments are numbered and correlate closely the laboratory and lecture divisions of the text. An unusual feature is the inclusion of experiments on hormones, vitamins and nutrition.

This text book has been written for students of nursing and the material is so well arranged that it can be adapted for courses in chemistry of 45 hours, 60 hours or 90 hours or more. Some of the changes made in the revision of the text includes brief discussions of the sulfonamides, the importance of intestinal bacterial synthesis of vitamines and the newer members of the vitamin B complex. A brief discussion is given to the renin mechanism in the pathogenesis of hypertension. This book will not only serve as a textbook but will prove to be a valuable reference book. Short descriptions are given of the van den Bergh test, the icterus index, the blood amylase test and carbon dioxide combining power.

The illustrations, many of them original, are most helpful. Students of nursing should find this an invaluable text. This volume should also be of great value as a reference for physicians, physical therapists and those who need to refresh themselves in this vital subject.

FIRST AID: SURGICAL AND MEDICAL. By *Warren H. Cole,* M.D., F.A.C.S., Professor and Head of the Department of Surgery, University of Illinois College of Medicine; and *Charles B. Puestow,* B.S., M.D., Associate Professor of Surgery, University of Illinois College of Medicine. Edition 3. Cloth. Pp. 434, with 193 illustrations. Price, $3.00. New York: D. Appleton-Century Co., 1945.

This is a book on medical and surgical first aid written in a manner so that it is instructive to nurses, students and corpsmen of the armed forces as well as physicians. It is particularly of value at this time of total war when a knowledge of proper first aid measures is imperative.

Certain important details of observation are brought out that are often neglected because they are so apparent. Correct methods as well as the end results of incorrect methods of first aid are emphasized. Simple but adequate illustrations are utilized to make the text more understandable.

Among the important additions to this edition are the changes in the discussion on shock, the Eve method of artificial respiration now popular in England and the chapter on the gas and bomb raid casualties. The relatively new compression bandage treatment of burns is also discussed. The chapter on medical emergencies is a novel and essential part usually not found in the ordinary texts on first aid.

This book is highly recommended for the teaching of first aid methods. It is a text that could be adopted by the armed forces as a reference book for their corpsmen because it furnishes an understanding of each problem with all the recent advances in the subject.

THE PSYCHOLOGY OF WOMEN. A PSYCHOANALYTIC INTERPRETATION. By *Helen Deutsch,* M.D., Associate Psychiatrist, Massachusetts General Hospital; Lecturer, Boston Psychoanalytic Institute. Volume Two. Motherhood. Cloth. Price, $5.00. Pp. 498. New York: Grune & Stratton, 1945.

This is the second volume of a psychoanalytic presentation of the special problems of the feminine psyche by a distinguished author and practitioner. The first volume on Girlhood was extremely well received and was reviewed in the July, 1944 issue of the ARCHIVES; the special qualifications of the author were also discussed there. Carrying on from the first book and its analysis of girlhood development, Dr. Deutsch now explores the successive phases of adult womenhood and its dual life. The discussion as contained in twelve chapters builds a vivid panorama of strikingly contracted types of women in every condition of life, from primitive cultures

to the varied social and economic levels of ultramodern civilization: Social and biologic aspects; Motherhood, Motherliness and Sexuality; The Preliminary phases; The Psychology of the Sexual Act; Problems of Conception; Psychologic Prerequisites of Pregnancy; Pregnancy; Delivery; Confinement and Lactation: first relations with the Child; The Mother-Child Relation; Unmarried Mothers; Adoptive Mothers, Stepmothers; Epilogue: The Climacterium. Active participation in the early phases of the work of Freud carries its imprint on all conclusions of the author. Throughout the entire study, the emphasis is on the normal and the contemporary and the author makes extensive use of case material illustrating the pathologic to the extent to which the aberrant sheds light on the normal. This second volume is a perfect sequence to the first one and should serve as a valuable book for daily guidance in professional work. It will undoubtedly be read profitably by mothers and prospective mothers.

THE HEBREW MEDICAL JOURNAL (HAROFE HAIVRI), Vol. I, 1945, dedicated to Henrietta Szold. Edited by *Moses Emhorn*, M.D., New York.

This special issue is dedicated to the late Henrietta Szold, distinguished humanist and Zionist, who brought American Jewish womanhood in a great organization, Hadassah, which is responsible for the vast network of medical and sanitary installations in Palestine. Hadassah sent its initial medical unit to Palestine in June, 1918 and brought the first small measure of relief to that country's then war-torn and pestilence-ridden population. During the Second World War Hadassah was recognized and accepted as the driving force which attempted to make Palestine an oasis of health in the subtropical Near and Middle East areas. Dr. S. R. Kagan contributes an article of particular interest on the work of the pioneer physicians to the growth and development for the Zionist movement throughout the world. They were not only the healers of the body and mind, but also leaders, statesmen and diplomats who fought for the rights and freedom of their brethren. Hebrew Medical Terminology is presented in Articles by A. Fried, M.D. and M. H. Leon, M.D. There is also an English section containing summaries and translations of all the articles for those readers who do not understand Hebrew.

THE STORY OF A HOSPITAL. The Neurological Institute of New York, 1909-1938. By *Charles A. Elsberg*, M.D., Chief of the Surgical Service (Emeritus) Neurological Institute, New York. Cloth. Pp. 174. Price, $3.50. New York-London: Paul B. Hoeber, Inc. Medical Book Department of Harper & Brothers, 1945.

When the Neurological Institute of New York was started in 1909 the idea of an institution entirely devoted to the study and treatment of diseases of the nervous system was new in the United States. The author of this volume was a member of the medical board of the Neurological Institute from its simple beginnings in a small building to its present day activities in the large and luxurious quarters at the Columbia University Medical Center. He describes briefly the state of knowledge of diseases of the nervous system at the beginning of this century and then records the discussions and actions of the founders of the institution, the organization of the original hospital in a vacant building in East 67th Street, the first years of its functioning, its important role in the neuropsychiatric work in connection with the first world war and its subsequent impressive progress in the post-war period, leading to its affiliation with the Columbia Presbyterian Medical Center in 1925 and the moving into a splendid new building. The last chapter contains an imposing account of the contributions of the Neurological Institute to the progress of neurology and clinical studies as well as in laboratory research. The volume is illustrated by some 35 single and group pictures of the medical staff, Board of Trustees, and its old and new hospital buildings. It offers a welcome record of the activities of a small group of medical pioneers.

ARTERIAL HYPERTENSION; ITS DIAGNOSIS AND TREATMENT: By *Irvine H. Page*, M.D., and *Arthur Curtis Corcoran*, M.D., Research Division of the Cleveland Clinic Foundation, Cleveland; Formerly Lilly Laboratory for Clinical Research, Indianapolis City Hospital, Indianapolis. Cloth. Pp. 352, 13 illustrations. Price, $3.75. Chicago: The Year Book Publishers, Incorporated, 1945.

The authors state that this "is a manual for the care of the patient with arterial hypertension, presented for those whose special interests do not lie exclusively in this field."

The book is developed in a manner which corresponds in the main to the common evolution of the disease and to the progress from examination to treatment. It is divided into five sections, the first dealing with normal blood pressure and classification of hypertension, tests designed to measure vascular responsiveness and early stages of hypertension. Section II deals with essential and malignant hypertension, physical examination and psychotherapy of hypertension. Section III deals with the circulation in early hypertension and clinical considerations in early hypertension. Section IV deals with hypertensive heart disease, effects of arterial hypertension on the brain, the kidneys in hypertension and hypertension and pregnancy. Section V deals with treatment by thiocyanate, kidney extract and vitamin A, treatment by nephrectomy and surgical treatment of hypertension. There follows an appendix giving a classification of the toxemias of pregnancy and a discussion of the estimation of cardiac hypertrophy.

The book is well documented and is written in a clear and intelligible style. It can be recommended without reservation to all physicians who wish an up-to-date and authoritative textbook on the diagnosis and treatment of arterial hypertension.

PHYSICAL MEDICINE ABSTRACTS

Knee Injuries in Soldiers. L. H. Wilkinson, and H. A. Burt.

Lancet 1:685 (June 2) 1945.

As a rule, tenderness of the semimembranosus insertion responds satisfactorily to physical treatment. The application of heat and friction on alternate days seem all that is required. After four treatments a noticeable improvement is apparent and the patient often volunteers that he is better able to straighten his affected knee.

Physical methods are disappointing with the other sites of tenderness. An occasional exception is the ion transfer of histamine or iodine in cases of painful ligamentum patellae.

Effusion which develops after exercise can often be prevented if a compression bandage is applied directly after such exercise. The bandage should be retained until the next morning and reapplied after further similar activity.

With quadriceps insufficiency by the time the convalescent stage has been reached non-weight-bearing remedial exercises are the most useful means of treatment. Weights and pulleys are popular, but as usually employed, with the patient sitting on a bench, they are unsatisfactory, as the exercise is often stopped with the knee short of full extension. The modification advocated by Duthie and Macleod, with the patient lying prone, is more satisfactory. Static contractions of the quadriceps are often poorly carried out with a tender ligamentum patellae, and the vastus internus, which is almost invariably the most wasted of the quadriceps group, cannot be correctly exercised when there is limitation of extension of the knee. On rare occasions efforts at obtaining full extension are carried too far and hyperextension is demonstrable, but this can sometimes be corrected by reeducation of the hamstrings.

The Management of Rheumatoid Arthritis. Francis Bach.

Proc. Roy. Med. 38:207 (March) 1945.

The four main clinical and pathologic forms of rheumatism are rheumatic fever, the rheumatoid type of arthritis, the osteo-arthritic type and non-articular rheumatism or fibrositis.

Although these forms of rheumatism are differentiated it is the sick man and not the disease process that we are called on to treat. People react in different ways to similar extraneous stimuli.

In brief it is pointed out that the successful treatment of the early and active phases of rheumatoid arthritis is dependent on close cooperation between the patient and the medical staff. The aim of treatment is to help the patient to increase his resistance by altering some of the constitutional and environmental pictures which cause ill-health and by this means to modify the clinical picture of the disease. Psychologic, medical, physical and sociologic measures play an important part in this achievement.

Colles' Fractures. J. Warren White.

South. M. J. 38:417 (June) 1945.

The author lists some "don'ts" for Colles' fractures: Do not attempt reduction without roentgenograms; do not attempt reduction without an anesthetic; do not stop short of anatomical reduction; do not use splints if plaster is available; do not take the cast off too soon; do not forget to tell the patient to move his fingers; do not use too strenuous physical therapy actively or passively and do not resort to subsequent surgery in older people.

Peripheral Vascular Disease. Geza de Takats.

J. Michigan M. Soc. 44:481 (May) 1945.

Mechanical means of increasing the vascular bed are many; the Buerger-Allen exercises alternately fill and empty the venocapillary bed; however, they are not apt to be carried out for a long enough period to do it consistently. The suction pressure apparatus has given a great impetus to all mechanical forms of vascular exercise, but it is an expensive form of treatment for which has been substituted with intermittent venous hyperemia. This form of treatment can be carried out at home with an ordinary blood-pressure apparatus, with a specially built leather cuff pumped by hand or with an automatic device operated by electricity, which the patient applies from two to twelve hours daily depending on the severity of his circulatory deficiency. The pressures and the time of constriction and release must be determined individually for each patient and so selected that during constriction a marked filling of the veins and rubor of the toes occur, whereas during release the limb takes on its normal color and the veins collapse. Many hundreds of patients have used such an apparatus for months and years and have increased their walking ability to a great extent.

Another device which has given decided benefit is the oscillating bed. This supplies the patient with a Buerger-Allen exercise, without any effort on his part and for six to eight hours a day continuously.

Simultaneous Treatment of Syphilis With Specific Drugs and Fever. H. Haxthausen.

Acta dermat.-venereol. 25:1 (June) 1944.

Haxthausen administered to 21 patients with primary syphilitic lesions 0.3 Gm. of neoarsphenamine, and to 20 patients 0.3 Gm. of neoarsphenamine and fever produced by simultaneous in-

travenous injections of a Bacillus and aerogenes faecalis vaccine in doses of 80 to 100 million bacilli. In the first group of patients the spirochetes disappeared in 4 of the 21 patients within twenty-four hours, whereas the same result was obtained in 17 of the 20 patients in the second group. Fever vaccine therapy alone did not have much effect on the number and the motility of the spirochetes three days after the fever. The effect of bismuth on the presence of spirochetes in syphilitic papules demonstrated a similar accentuation of the bismuth effect by fever therapy. This suggested that intensification of the effect of the specific drugs may result from combining fever with specific drugs. It is advisable to employ fever therapy simultaneously with the specific drugs in old refractory cases, and particularly in cases in which the usual treatment is ineffective from the onset or in which treatment is soon followed by a relapse. One should employ doses of 0.6 Gm. for women and 0.75 Gm. for men. No untoward reactions were observed from these doses and fever therapy, whereas in 1 refractory case in which neoarsphenamine was given in 0.9 Gm. doses the second combined injection was followed by the occurrence of hepatitis.

Trench Foot and Immersion Foot. J. C. White, and W. B. Scoville.

New England J. Med. **232**:415 (Apr. 12) 1945.

White and Scoville state that trench foot and immersion foot are similar clinical entities that differ from frostbite in the type of exposure and the reaction of the tissues and their method of recovery. Three stages are described: the initial response to cold, short of actual freezing of the tissue cells, the early period of recovery, characterized by painful hyperemia, and the residual effects of fibrosis. The initial treatment is similar to that for burns but should include cooling to reduce the oxygen demands of the skin to a level compatible with the flow of blood through damaged subcutaneous vessels. Late treatment consists in conservative minimal amputations, exercises and physical therapy to decrease tissue fibrosis and joint stiffness and sympathectomy in selected cases with residual circulatory insufficiency. Gangrene of the toes and distal portions of the feet constitutes a serious problem in trench foot but is rare in immersion foot, in which the lower extremities are less liable to trauma and infection.

The Management of Osteo-Arthritis. A. R. Neligan.

Proc. Roy. Soc. Med. **38**:210 (March) 1945.

The chief indications in the management of an established case of osteo-arthritis are: To secure the cooperation of the patient; to ensure the best possible environment for him; to remove etiologic factors or, at least, lessen their effects; to maintain function and to relieve pain and improve the condition of the joint. Rest periods are the single essential part of management in osteo-arthritis.

Most osteo-arthritics are cheery, energetic folk, used to working hard and playing hard, so it is wise on general grounds to allow them as much activity as may be judged prudent. The diet of the elderly should suit digestion and be well balanced. If the osteo-arthritic is overweight, drastic reduction is an excellent way of sparing spine and legs and may give dramatic all-round improvement.

"Management" of general activity helps to preserve joint function in damaged joints, but something more is needed, namely, active stretching of the joint and active training of special muscle groups.

Expert physical treatment gives opportunities for review.

Massage and exercises for the associated muscles, as well as general exercise, improve the joint circulation and so should attention to varicose veins in the case of the lower limbs. However, fibrositis of muscles and joint capsules are the chief indications for massage in osto-arthritis.

A Fluorescent Guide to Local Circulation.

Brit. M. J. **4403**:740 (May 26) 1945.

The diagnosis and the prognosis of peripheral vascular disease is a complicated matter which needs the accurate plotting of skin temperatures, oscillometric determinations and often arteriography after injection of thorotrast or other x-ray-opaque solution, and the effects of blockage of the sympathetic innervation or of intermittent venous occlusion. A relatively simple method which gives a direct insight into the nutrition of the tissues is welcome, especially when it has been thoroughly tested in over 1,000 patients without untoward reactions. A 5 per cent fluorescein solution is injected intravenously and its arrival in the tissues under examination demonstrated by its fluorescence under ultraviolet rays. Fluorescein absorbs the invisible ultraviolet and converts it instantaneously into a visible yellow-green light; the method requires a dark room and a mercury vapor lamp with an appropriate filter to give an ultraviolet beam of wavelength 3,600 angstroms, at which fluorescein shows its maximum fluorescence. The lamp can be directed on to any part of the patient and the fluorescence of suspected areas of deficient circulation can be rapidly compared with the normal.

Experiences in the AAF Convalescent Program. William J. Kennard.

Rocky Mountain M. J. **42**:432 (June) 1945.

It is firmly believed by those who have been most clearly associated with the excellent results obtained through the Army Air Force convalescent program that this activity which reached its highest form in organized convalescent hospitals, providing physical therapy, occupational therapy, vocational and avocational therapy, remedial exercises, athletics, sports and recreational activities has constituted one of the greatest advances in medical treatment and understanding to evolve from the present war. It can almost be said to constitute a new phase in medical history comparable to the great advances made in preventive medicine of the past decades.